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Wilson, S. G., 98.
Winter, A. R., & Nadal, R., 105.
Wolfson, F. See Hegner, R., jt. author, 87.
Woodruff, C. E., & Willis, H. S., 104.
Wyckoff, R. W. G. See Beck, C. E., jt. author, 90.
—. See also van der Scheer, J., et al., jt. authors, 109.

Youmans, G. P. See Hoffstadt, R. E., jt. author, 75.

Zuccarini, J. A. See Arena, A. R., et al., jt. authors, 76.

Bulletins on disease subjects written for farmers and "popular" articles of a similar nature are not included in the *Veterinary Bulletin*. Those of a sufficiently important nature, are, however, included in *Index Veterinarius*; so also are certain review articles, presidential addresses, congress proceedings, etc., where the title conveys as much information as could be given in an abstract of a few lines. For information of this nature, readers of the *Veterinary Bulletin* are referred to *Index Veterinarius*, where titles of all publications indexed by the bureau are fully cross-referenced.

The Editor will be glad to receive publications relating to Veterinary Science and cognate subjects in order that they may be dealt with in the *Veterinary Bulletin*.

Reports of Departments, Special Reports, reprints, etc., etc., should be sent as soon as they are issued.

Books for Review.

The Editor will be glad to receive books for review in the *Veterinary Bulletin*.

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IMPERIAL BUREAU OF ANIMAL HEALTH

THE

VETERINARY BULLETIN

Vol. 11.] February, 1941. [No. 2.

DISEASES CAUSED BY BACTERIA AND FUNGI

MILLER, W. T., & HEISHMAN, J. O. (1940). **Bovine Mastitis Caused by Unusual Types of Streptococci.**—*Cornell Vet.* **30.** 310–318. 1 table. [15 refs.]

A small herd troubled with mastitis was examined four times within a period of eight months; at three of the examinations composite samples of milk were collected from each animal, while, at the fourth, quarter samples were taken. Of the 44 animals in the herd examined one or more times, 28 were found to be harbouring streptococci in one or more quarters. Sixty-nine strains of these organisms were isolated. Of 68 strains tested biochemically and serologically, 44 were similar and were proved by precipitation tests to belong to the group G streptococci of Lancefield. Group G streptococci have rarely been found in the bovine udder, but during the course of this examination they were isolated repeatedly from several animals and appeared in previously uninfected cows, one being a first calf heifer. Considerable damage must result from their activities, since of the 19 animals in the herd found with extensive induration of the udder, 13 were harbouring organisms of this type. The authors suggest that, because of their haemolytic action on blood agar and their pathogenicity for mice, type G streptococci might have some harmful effect in human beings consuming infected milk. No evidence, however, was found to confirm this.—J. R. L.

FERGUSON, Jean. (1940). **The Bacteriology of Acute Mastitis.**—*Cornell Vet.* **30.** 299–309. 3 tables. [10 refs.]

Streptococcus agalactiae, the common causal agent of bovine mastitis was found in only one of 54 samples of milk from cases of acute mastitis examined. Twenty-two cases were found to be due to members of the coliform group of organisms, and in eight cases staphylococci were found in abnormally large numbers (over 3,000 per c.c.). In ten instances β-haemolytic streptococci were present and in one of these *Str. agalactiae* was also found, it being considered possible that the quarter from which the sample was obtained had been chronically infected with the organism, the β streptococcal infection being brought about by injury. In four samples, all of which were septic, *Corynebacterium pyogenes* was isolated. Other causal organisms found were *Str. dysgalactiae* and *Str. uberis*. In view of the clinical nature of the disease and the organisms associated with it, F. considers that injuries, particularly those of the teat meatus, play an important part in the causation of acute mastitis, and suggests that acute mastitis is neither contagious nor a stage in the chronic form of the disease.

Examinations were also made of 109 other samples of milk from subacute cases. Staphylococci were present in 41, *C. pyogenes* in 11, α streptococci in 25, and coliform organisms alone in 8.—J. R. LAWSON.

I. DAVIS, J. G., & ROGERS, H. J. (1939). **A Hippurate Aesculin Broth for the Identification of Streptococcus agalactiae.**—*Abst. Proc. Soc. agric. Bact., 1939.* pp. 41–42.

II. PLASTRIDGE, W. N., BANFIELD, Laura F., & WILLIAMS, L. F. (1940). **Agglutin-**

ability of Mastitis Streptococci.—*J. infect. Dis.* **66.** 202–211. 9 tables. [19 refs.]

I. The authors state that the labour involved in routine bacteriological examinations of milk samples can be greatly reduced by using hippurate broth to which aesculin has been added. This medium can be used alone or in combination with the aesculin, yeast, and litmus milk medium previously described by the authors [*V. B.* **10.** 1]. When only the former medium is used a single colony is picked from the primary plate into the broth. It is incubated for two days at 37°C. and examined for the type of growth. The hippurate test is then performed in the usual way by adding ferric chloride solution. The absence of blackening indicates that there has been no hydrolysis of aesculin. This, together with the presence of a buff coloured precipitate which is formed if the hippurate has been hydrolysed, is claimed to be an adequate test for *Str. agalactiae* in routine work. No other *Streptococcus* which is likely to be encountered behaves in this way.

II. Antisera for these experiments were prepared by injecting rabbits with formolized cultures of streptococci. Pooled antisera against 11 serological types of *Str. agalactiae* and *Str. uberis* [group III mastitis streptococci] were prepared. Only one strain of *Str. dysgalactiae* [mastitis group II] was used in the preparation of antiserum. [This is surprising as it has been shown that there is more than one serological type—see *V. B.* **3.** 856.]

Careful tests were carried out to ascertain the best culture media for the production of specifically agglutinable suspensions of streptococci and the following procedure was evolved :– (1) the organisms were grown in beef infusion medium containing 2 % difco-proteose peptone, 0·4 % dextrose, and 1 % K_2HPO_4, the pH being adjusted to 7·4; (2) strains which yielded granular suspensions were resown in the same medium to which 1 % inactivated ox serum had been added, and (3) strains which were inagglutinable in the original medium were grown in one containing 0·1 % instead of 0·4 % dextrose. Organisms which did not then yield agglutinable suspensions were tested by biochemical and precipitin methods.

The slide agglutination technique was used throughout and the following results were obtained :–

	Number of strains.	Specifically agglutinated by the first method.	Specifically agglutinated by one of the other two methods.	Not specifically agglutinated by any of the three methods.
Str. agalactiae...	242	179	63	2
Str. dysgalactiae	14	2	7	5
Str. uberis ...	34	20	9	5

—JOHN FRANCIS.

STECK, W. (1939). Tilgung des gelben Galtes. IV. Erfahrungen über Diagnose, Aetiologie und Pathogenese. [**Eradication of Mastitis. IV. Diagnosis, Aetiology and Pathogenesis**].—*Schweiz. Arch. Tierheilk.* **81.** 179–196 and 232–242. 4 tables. [Numerous refs.] [See also *V. B.* **10.** 70].

This is a continuation of earlier work. S. divides the streptococci of milk into four groups :– (1) extraneous types ; (2) pathogenic streptococci, other than *Str. agalactiae*, such as *Str. pyogenes* ; (3) non-pathogenic streptococci and (4) streptococci of mastitis. His methods for differentiating between them depend on morphology, biochemical and serological reactions, and on mouse tests for group 2. He considers that the serological reactions are too laborious and complicated for general diagnostic purposes. The biochemical tests recommended for general work are the reactions in saccharose, raffinose, inulin, mannite, and sorbite. In special cases, blood plates, litmus milk, hippurate broth, and trehalose are used. Control work embraced 125 herds, most of the samples from which were collected by practitioners. Fore milk was used and the cultures made as shake cultures in serum-glucose agar [*V. B.* **10.** 70]. Streptococcal colonies were picked and the reactions tested on agar slopes containing bromcresol purple and the requisite substrate. Details of the reactions of 3,974

strains are given, the vast majority fermenting saccharose strongly, but not inulin, mannite, raffinose, or sorbitol. Full details are also given of organisms from several " atypical mastitis " cases in which some of the other substrates were fermented.—P. S. WATTS.

McCULLOCH, E. C., & FULLER, S. A. (1939). **A Study of Streptococci Producing Positive Hotis Reactions.**—*J. Bact.* **38.** 447–459. 4 tables. [10 refs.] [Authors' summary copied *verbatim*].

The Hotis test has been described as being specific for *Streptococcus agalactiae*, but in this work, using both unheated milk and sterilized Hotis-negative milk plus blood serum, it has been found that many organisms, of the genus *Streptococcus* at least, are able to produce the reaction.

The Hotis reaction appears to be an agglutination reaction and the alteration of the surface which causes the organisms to clump would cause them to tend to migrate to the surface of the test tube and adhere.

It appears that the yellow flakes or balls which form on the side of a tube of brom-cresol-purple milk after incubation, and which have been considered diagnostic of *Streptococcus* agalactiae in the Hotis test, may be produced by any organism which :– 1. Stimulates the production of agglutinins. 2. Grows in the presence of 0·025 per cent brom-cresol-purple in a milk medium when incubated in a test tube under aerobic conditions at 37·5°C. 3· Forms clumps on the side of the tube when gr own in the presence of its agglutinins. 4. Produces sufficient acid from lactose to increase the hydrogen ion concentration to about pH 5·4.

HOFFSTADT, Rachel E., & YOUMANS, G. P· (1938). **Dissociation of Single Cell Cultures of Staphylococcus aureus.**—*J. Bact.* **35.** 511–514. 1 table. [2 refs.] [Authors' summary copied *verbatim*].

Both single-celled strains obtained from the whole-yellow undissociated strain of *Staphylococcus aureus* dissociated, while the single cell strain obtained from the white variant of this same culture did not dissociate. There was a difference in the capacity to dissociate between strain 31 and strain 24. The former produced both white and yellow variants while the latter only produced yellow; the former dissociated more readily in plain broth, while the latter dissociated only in lithium chloride broth. A G form was obtained only from strain 31. All white forms were more active enzymatically than the yellow forms, and the sera produced from all strains were virulent, and only one strain obtained in this study had been reported by us before and none gave the cultural characteristics of the type strains usually described.

From the above results the variation of the physiological characteristics of bacteria upon dissociation, would seem to be profoundly influenced by the type of cell dominant at the time of culture.

PARFENTJEV, I. A., COLLINS, S. W., Jr., & CROSS, Margaret. (1940). **The Effects of the Injection of Glucose upon Experimental Staphylococcal Infection in Mice.**—*J. Immunol.* **38.** 137–141. 2 tables. [5 refs.]

Mice injected intraperitoneally with live staphylococci, mucin, and then glucose succumbed to a smaller number of organisms than did those injected with live staphylococci and mucin. In some experiments the lethal dose (number of staphylococci) for mice injected with culture plus glucose was only one-half, one-tenth, or even a smaller fraction of the lethal dose for mice injected at the same time but receiving no glucose.—J. M. ROBSON.

KÄMPE, A. (1939). Om pneumokocker som orsak till kalvdiarré. **[Pneumococci as a Cause of Calf Diarrhoea].**—*Skand. VetTidskr.* **29.** 1001–1017. 3 tables. [Numerous refs.] [English summary].

Out of about 550 cases of death in calves sent for diagnosis in 1937 and 1938 to the State Veterinary Bacteriological Institute, Stockholm, 55 were diagnosed as pneumococcal infection. Nearly all cases involved the rapid death of one-week-old calves, though a few were as old as one month when stricken.

The characteristic P.M. sign of the disease is a greatly enlarged spleen, which is dark red and rubber-like and firm when cut. There are also numerous subserous haemorrhages, congested intestinal mucosa, swollen visceral and regional lymph nodes, and congestion of the kidneys.

Natural infection appears to occur *per os* or through the navel.

The causal organism is described in detail. K. examined serologically ten calf strains and found that one was type VII, one type VIII, two type XIX, one type XXI and two type

XXVIII. Three strains could not be identified with any of the 32 standard types.—J. E.

GAGO DA CÂMARA, N. J. (1938). Ensaios de vacinação carbunculosa com uma lipo-vacina. [**Anti-Anthrax Vaccination with a Lipoid-Vaccine**].—*Repos. Lab. Pat. vet., Lisboa.* **3.** 221–223. [English and French summaries].

In view of many deaths following the use of carbozoo anti-anthrax vaccine for goats, the author prepared a vaccine according to the method described by RAMON and STAUB [*V. B.* **6.** 198]. In tests carried out 24 hours after preparation, six sheep and six goats each received 1 c.c. subcutaneously and two g. pigs received 0·5 c.c. each. The vaccine proved successful in the sheep, but was harmful for the goats, in some cases causing death within a short period. The surviving goats and g. pigs developed no immunity.—MILLER WATSON.

BRENNAN, A. D. J. (1940). **The Attested Herds Scheme in South Wales—Some Reflexions.**—*Vet. Rec.* **52.** 407–411.

B. showed by tables that the number of cattle in the Attested Herds Scheme or registered in supervised herds averaged about 60% of the last census figures for three counties in S. Wales, the corresponding figure for the remaining four counties being 12%. For the same three counties only 3·6% of 65,361 cattle examined at the test survey gave reactions, and 0·025% of reactors were found at " renewal " tests. The few " breakdowns " which occurred in the area are ascribed to non-reacting open cases, or to infection with the avian or human types of bacillus. B. stresses the importance of injecting the tuberculin at a uniform depth when doing intradermal tests. [His description of a negative reaction—a marble-like swelling which is " loose in the skin " is not very clear.] The importance of skin measurements has been shown by test charts of consecutive tests, even when the character of the swelling has appeared to be negative at one or more initial tests. The increased value of attested market cattle, plus the bonus payments for milk, etc., have made the scheme, once it has become well established, an unqualified success. Several other aspects of the subject are dealt with in the paper and in the discussion which followed.—C. V. W.

TROPA, E. (1938). Histo-patologia da glândula mamária de vacas leiteiras tuberculosas do Porto e arredores. [**Histopathology of the Udder of Tuberculous Dairy Cows in and around Oporto**].—*Repos. Lab. Pat. vet., Lisboa.* **4.** 145–153. 5 figs. on 5 plates. [English and French summaries].

Twenty-four per cent. of the udders of tuberculin reacting cows showed varying degrees of mastitis lesions even when the typical lesions of tuberculous mammitis were not found. Detailed descriptions are given of five microscopic sections.—MILLER WATSON.

BEIJERS, J. A. (1940). Eenige afwijkende beelden van tuberculose bij paard en rund. Skinlesions bij het rund. [**Cases of Tuberculosis in the Horse and Ox and Skin Lesions in Cattle**].—*Tijdschr. Diergeneesk.* **67.** 267–279. 3 graphs.

B. describes three cases of TB. in horses and three cases of skin lesions in cattle which reacted to the tuberculin test. The horses all reacted atypically to the ophthalmic tuberculin test and TB. was diagnosed after death. The skin lesion cases appear to be typical of the condition as described elsewhere.—L. TOBBACK.

ARENA, A. R., OYUELLA, A., & ZUCCARINI, J. A. (1938). Identificación del tipo de *Mycobacterium tuberculosis* aislado en lesiones de cerdos faenados en la ciudad de Buenos Aires. [**Type of *Mycobacterium tuberculosis* Isolated from Pigs in Buenos Aires**].—*Folia Biol., B. Aires.* No. 85. pp. 361–364. [English summary]. [Abst. from abst. in *Bull. Hyg., Lond.* **13.** 913. Signed : H. H. S.]

Reference is made to the frequent isolation by other workers of the bovine type bacillus from pigs. The authors isolated the bovine and not the avian type from ten pigs (five with generalized and five with localized TB.) at the Buenos Aires municipal abattoir. Bacteriological, histological, cultural and animal inoculation methods were used for diagnosis.

PANSERA, D., & FROSIO, G. (1938). Ricerche del B.C.G. nei noduli vaccinali dei bovini. [**BCG at the Sites of Vaccination in Cattle**].—*Pat. comp. Tuberc.* **4.** 90–111. 4 tables. [English, French and German summaries]. [Abst. from authors' English summary].

In researches carried out on 23 nodules from BCG vaccination in calves, the authors confirmed the results previously obtained by Pallaskas, by showing by microscopic examination direct on the material of the nodule and with cultures on Petragnani's medium, that the

BCG remains in the vaccine nodule and can be isolated a long time after vaccination.

Biological tests have proved the absolute harmlessness and lack of pathogenic power of the bacilli or acid-resisting granules observed in the nodules, and which have grown in the cultures.

Gróh, E., & Remete, T. (1939). Bakteriologische Typenuntersuchungen in histologischen Präparaten bei Nierentuberkulose. **[Types of Tubercle Bacilli in Cases of Human Renal TB.]**—*Zbl. Bakt. I.* (*Orig.*). **144.** 495–501. 1 table. [6 refs.] [Abst. from authors' summary].

Fifty-five cases of human renal TB. and one of testicular TB. were examined culturally and histologically for the simultaneous presence of human and bovine type bacilli. It was found that the bovine type bacilli alone caused only a cellular infiltration, but soon lost their acid-fastness and died out later. Bovine type bacilli were never found as the sole cause of the above cases. The results of the work supported the opinion that human type bacilli alone were incapable of causing the renal tuberculous processes; in each case both the human and bovine types of bacillus were present in varying proportions. The authors conclude from their work that the bovine type bacillus plays an important part in the genesis of human urogenital TB.—J. E.

Schaefer, W. (1939). Sur la structure antigénique des bacilles tuberculeuse humains et bovins. **[The Antigenic Structure of Human and Bovine Tubercle Bacilli]**.—*C. R. Acad. Sci., Paris.* **209.** 129–131. [5 refs.]

A specific antigen, protein in nature, is found in bovine tubercle bacilli permitting a distinction by serological reactions between human and bovine types. This antigen occurs in S as well as in R bovine strains, although its antigenic power is only shown *in vivo* with S strains. Bovine bacilli may contain two of these antigens, one specific to the type and the other common to both human and bovine bacilli; according to the species of animal inoculated one or the other of these protein antigens exerts a preponderant action in the formation of antibodies.—Alfred Eden.

I. Plum, N. (1938). Undersøgelse over Svinetuberkulosen paa Holbaek Svineslagteri. Paavisning af syrefaste Kokkobaciller i tuberkuloselignende Processer hos Svin. **[Porcine Tuberculosis at Holbaek Abattoir. Demonstration of Acid-Fast Cocco-Bacilli in Tuberculous Lesions in Swine]**.—*Maanedsskr. Dyrlaeg.* **49.** 653–661.

II. Plum, N. (1939). Om Corynebacterieinfektioner hos Svin. **[Corynebacterium Infection in Swine]**.—*Ibid.* **51.** 178–185.

III. Bendixen, H. C., & Jepsen, A. (1940). Fortsatte undersøgelser over Corynebacterium equi navnlig med henblik paa visse morfologiske og biologiske forhold samt patogenitetsforhold over for svin. **[Further Research on *Corynebacterium equi*: Its Morphology and Biology and its Pathogenicity for Swine]**.—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 55–92. 12 figs., 6 tables. [12 refs.] Discussion pp. 92–97. [English summary].

IV. Jepsen, A. (1940). Om diagnosen af de ved infektion med Corynebacterium equi foraarsagede tuberkuloselignende processer i svinets halslymfekirtler, saerlig med henblik paa undersøgelsen ved kødkontrollen. **[Tuberculosis - Like Lesions in the Cervical Lymph Nodes of Swine, Really Caused by *Corynebacterium equi*]**.—*Ibid.* pp. 557–577. 1 fig., 2 tables. [8 refs.] Discussion pp. 577–583. [English summary].

I. Cultural tests using Löwenstein's and Besredka's media on material from swine detained at Holbaek abattoir on account of suspected TB. showed that 69 cases were infected with the avian type of tubercle bacillus, 25 with the bovine type, and one with both types. In 84% of the 69 cases and in 24% of the 25 cases, infection was localized to the alimentary canal.

A cocco-bacillus [later identified as *C. equi*] was isolated from TB.-like lesions in the submaxillary lymph nodes of 15 other pigs.

II. After an introduction in which is given the history of the discovery of *C. equi* infection of the submaxillary lymph nodes of swine in Denmark, P. details the results of diagnostic work at the Serum Laboratory, Copenhagen, on material from Bornholm, Holbaek, and Nykøping in Falster. The methods used were microscopic (modified Ziehl-Neelsen as in III) and cultural (agar, tellurite agar, Besredka's and Löwenstein's media). Using the results of culture on Löwenstein's medium as the

criterion, 332 of the Holbaek cases proved to be due to *C. equi* infection, 63 to bovine type tubercle bacilli, and 494 to avian type tubercle bacilli; negative results were obtained from 391 cases.

Comparative results are also given for 183 cases tested by culture (L.'s medium) and microscopically. Agreement was very close, so that the latter method can be regarded as very reliable in practice. Figures are not given for Bornholm or Nykøping, but it is stated that *C. equi* infection is less common in these places.

P. has found that *C. equi* is very slightly pathogenic for pigs, in contrast to the findings of BENDIXEN and JEPSEN [below]. For ordinary work on *C. equi* infection, P. recommends the combined use of ordinary agar and tellurite agar.

III. The authors report on their research into the causal organism, known hitherto as Holth's bacillus [*V. B.* **9.** 291 and 822.], of tuberculosis-like lesions in the cervical lymph nodes of swine. The organism is a short, thick, oval rod 1–2μ long and 0·7–1·5μ wide. It is Gram-positive and acid-fast in smears from lesions. The organisms may be masked if carbol methylene blue is used as the counter-stain in Ziehl-Neelsen's method: 1% malachite green or 1% picric acid are recommended instead.

In cultures the organism varies greatly, multiplying forms being long rods, commonly found in V-shaped forms which are not acid-fast, whilst in older cultures the typical cocco-bacillus acid-fast form becomes progressively more prevalent with the age of the colony. The latter form is more heat-resistant than the former. Tellurite agar is a good selective medium.

A number of experiments were made to test the pathogenicity of the organism. 1. A litter of nine three-week-old piglets were infected with an agar culture washing, either *per os* or by injection subcutaneously, intravenously, or intraperitoneally. The piglets were killed at intervals (24–100 days) and examined for lesions and for the presence of the organism in appropriate organs and lymph nodes. Infection was set up in all cases, but did not spread from the infection atrium. Lesions were small and tuberculous in appearance. Piglets infected perorally developed infection in the sub-maxillary and bronchial l.nn. and in the lungs. 2. Nine 7-week-old piglets were all infected *per os* and were killed for examination from 4–84 days later. The lungs and bronchial l.nn. were the only organs regularly affected and the submaxillary l.nn. were only involved in five cases. 3. Of nine piglets, six were infected by nasal instillation, one each by injection (subcutaneous, intravenous, and intraperitoneal) and three were placed in contact with the other six. The animals were killed at intervals from 5–97 days later and examined. The first three pigs showed infection of the nasal cavity, submaxillary l.nn. and bronchial l.nn.; the next three reacted as in the previous experiments, and the in-contact piglets remained unaffected except one which had a small lesion in a submaxillary l.n.

It is mentioned that changes similar to those described above were seen in some pigs sent in for diagnosis from a state experimental farm.

The histology of the lesions in the lungs and l.nn. at 4, 8, 18, and 79 days after infection is described. The changes produced were sub-acute or chronic and consisted of a catarrhal inflammation which was markedly limited in extent by capsule formation.

In the discussion on this paper B. referred to the finding of apparently the same organism in the soil of New South Wales by JENSEN [(1934). *Proc Linn. Soc. N.S.W.* **59.** 19]. He, therefore, examined samples of Danish soil and recovered *C. equi* from 42 out of 65 samples taken from places where pigs had, or had not, been kept. Some of these strains, on testing for pathogenicity on pigs and on a horse, proved to be less virulent than strains isolated from clinical cases. OTTOSEN reported that he had had most reliable results in the cultivation of *C. equi* by using both tellurite agar and ordinary agar. He also suggested that the lung changes after peroral infection were due to direct passage of culture down the trachea. He found it difficult to set up such lung lesions by direct injection of culture into the trachea or lungs. He also drew attention to the possibility that some of B.'s test piglets might have been naturally infected. B., in reply, said *inter alia* that *C. equi* is the correct name for the organism under discussion.

IV. J. reviews the different aspects of methods used for diagnosis. For microscopic diagnosis he recommends the Ziehl-Neelsen method outlined in III, with 25% H_2SO_4 for the decolorization. Tellurite peptone agar (K_2TeO_3 1 : 10,000) is recommended for isolation from contaminated material. As colonies of *C. equi* grow they reduce the tellurite

and their centres assume a dark tone while their edge remains light. Certain cocci also grow on this medium, but their colonies have no resemblance to *C. equi*.

These methods were tested on 400 samples of material from affected submaxillary l.nn. of abattoir swine, media for tubercle bacilli also being sown. The results gave 177 cases of *C. equi* infection, 180 of TB., and 5 of both together: the results of macroscopic, microscopic and cultural diagnosis of these 400 cases are illustrated graphically. A period of 36–48 hours is necessary before a cultural diagnosis of *C. equi* infection can be given.

In the discussion MAGNUSSON described similar work on material from southern Sweden, showing that *C. equi* infection is not uncommon in swine.—J. E.

VINCENT, & ROSSI. (1938). L'érysipéloïde de Rosenbach rouget du porc chez l'homme. Transmission per les fumiers. **[Rosenbach's Erysipeloid or Swine Erysipelas in Man. Transmission by Dungheaps].** —*Lyon méd.* **70.** 25–33. [Numerous refs.] [Abst. from abst. in *Bull. Hyg., Lond.* **13.** 974. Signed: J. D. ROLLESTON.]

An account of a case of erysipeloid [*Erysipelothrix rhusiopathiae* infection] in a human being, contracted by contamination of skin wounds with faeces from healthy swine. This is claimed to be only the second case where it has been possible to confirm diagnosis by blood culture. Reference is made to the apparent rarity of the disease in man in France, and to possible sources of infection, including pigs, sheep, horses, and fish.

GIRARD, G. (1940). La réaction des nitrites pour la differenciation du bacille de la peste et du bacille de la pseudotuberculose. **[Nitrite Test for the Differentiation of *Pasteurella pestis* and *Past. pseudotuberculosis*].**—*C. R. Soc. Biol. Paris.* **133.** 244–246. [2 refs.]

G. prefers the fermentation of rhamnose peptone water to Griess's nitrite production test in liver broth for the differentiation of *Past. pestis* and *Past. pseudotuberculosis*. As 90 out of 103 strains of *Past. pestis* from various sources gave a positive nitrite production test of very variable intensity, he could not accept it as a test of absolute value.—R. O. MUIR.

I. THOMSON, A. P., WILSON, G. H., & MCDONALD, S. (1937). **Three Cases of Unusual Illness with Eosinophilia—One with Lesions in the Liver Resembling those of Tularaemia.**—*Lancet.* **233.** 9. 4 figs. [4 refs.]

II. THOMSON, A. P. (1940). **Tularaemia or Fluke Infection. [Correspondence].**—*Ibid.* **239.** 83–84.

III. ANON. (1940). **Clinical Aspects of Tularaemia.**—*Ibid.* 18. [6 refs.]

I. This is an account of illness in three persons who became ill after taking a holiday together in Ireland, in the course of which they did some rabbit shooting. It is stated that there was an epidemic among the cats of the neighbourhood while the patients were on their holiday. No information was given as to the nature of the cat disease.

The illness of the human beings was considered to be, to some extent, reminiscent of tularaemia. The cause of the illness was not diagnosed, but clinical and serological evidence was against a diagnosis of tularaemia.

II. T. gives further information on the cases of supposed tularaemia reported in I above. Sections of a fragment of liver, excised at operation from one of these patients, were submitted to LILLIE of the National Institute of Health, Washington, D.C., who agreed that " the process is not inconsistent with tularaemic foci in the second month of a non-fatal illness ". BÜRGI, of Switzerland said that similar changes were to be found in the livers of animals soon after infection with liver fluke (*Fasciola hepatica*). T. is convinced that the cases were actually of fluke infection, and that such infection of man in the British Isles is not as rare as is generally believed.

III. " Strangely enough there have still been no proven cases of tularaemia in this country (United Kingdom) apart from those in the laboratory workers at the Lister Institute, although most countries in Europe have had their epidemics ". Reference is made to the publication by THOMSON, WILSON and MCDONALD [see I, above], the cases referred to by these authors being described as suspicious but unlikely to be tularaemia because of the serological and clinical evidence.

The disease is definitely on the increase in the United States, there being 2,088 cases with 139 deaths in 1938 and 2,200 cases with at least 150 deaths in 1939.

Human beings are generally infected *via* the skin, usually as the result of a prick with infected material or infection of an abrasion. The skin of infected rabbits or other animals

may convey the infection, and inadequately cooked infected flesh has probably caused several outbreaks.

Accurate diagnosis requires laboratory assistance, either cultivation of the organism or one or more of the following tests being used :– the agglutination test, the opsonocytophagic reaction and the antigen skin test. The agglutination test with blood is the most constant and reliable after the first week of illness ; the antigen skin test is considered to be highly specific and reliable and will give a positive result in the first week of illness.

GRAHAM, R., DUNLAP, G. L., & BRANDLY, C. A. (1938). **Ovine and Bovine Listerellosis in Illinois.**—*Science.* **88.** 171–172. [10 refs.]

A description is given of two outbreaks of ovine and one outbreak of bovine encephalitis and/or encephalomyelitis associated with *Listerella.* The symptoms in lambs consisted of depression, weakness, incoordination, fever, walking in circles, pushing against objects with the head, anorexia, and progressive paralysis terminating in coma and death ; an ophthalmia of transitory nature was observed in some of the mildly affected animals. Five of the lambs were autopsied and *Listerella*-like organisms were isolated from the brain stems.

The bovine outbreak occurred among a herd of steers, the principal symptoms being a glassy, dazed expression of the eyes, partial paralysis of the mandible, elevation of the head and salivation ; prostration and coma occurred 3–4 days before death. *Listerella* were isolated from the brain stem of two of the steers. No gross pathological changes in any of the organs were observed P.M.

The pathogenic properties of a *Listerella* strain isolated from one of the outbreaks in sheep were established by artificial exposure of healthy lambs, calves, chickens, g. pigs, rabbits, and rats. The cultural and biochemical properties of the strains isolated from the three outbreaks described conformed to the genus *Listerella.*—R. ALLCROFT.

TRUCHE, C., FORGEOT, P., & MEDYNSKI, C. (1939). Enzootie de salmonellose équine. Réflexions suggéreés par celle-ci. Nouvelle preuve de l'efficacité de la vaccination. **[Enzootic Salmonella Infection in Horses. Vaccination Trials].** —*Bull. Acad. vét. Fr.* **12.** 319–324. [1 ref.]

Groups of weaned foals were placed on grazing land, where they soon began to lose condition and some died of chronic debility. Clinical diagnosis failed, so the Pasteur Institute, Paris, was consulted, after numerous empirical treatments had proved useless and 13 foals had died.

Salmonella infection was diagnosed and a heat-killed vaccine was prepared. Three subcutaneous injections were given and there were no further losses.

As the farm was on the coast near a lighthouse and in the path of migratory birds, the authors suggest that birds may have acted as vectors of the disease. The causal organism agglutinated *S. paratyphi* B. Two mares which lost their foals within 24 hours of birth reacted to an agglutination test.—C. V. WATKINS.

BRUNER, D. W., & EDWARDS, P. R. (1939). **Microorganisms of the *Salmonella choleraesuis* Group Isolated in the United States.**—*Amer. J. Hyg.* Sect. B. **30.** 75–81. 1 table. [Numerous refs.] [Authors' summary copied *verbatim*].

The examination of a number of cultures of the *S. choleraesuis* group demonstrated that the Kunzendorf variety is the predominant type among these bacilli in the United States. *S. choleraesuis*, which formerly predominated, is now found only occasionally. By the use of the Wassén technic it was possible to isolate specific components from all the Kunzendorf strains examined. Three cultures of the Kunzendorf type were found to occur naturally in the diphasic state.

I. EDWARDS, P. R. (1939). **Incidence of Salmonella Types in Fowls in the United States.**—*Proc. 7th World's Poult. Congr., 1939.* pp. 271–274. 1 table. [9 refs.] Washington, D.C. : U.S. Dep. Agric. [In English].

II. VAN ROEKEL, H. (1939). **Present Status of Pullorum Disease in the United States.**—*Ibid.* pp. 278–282. 2 tables. [14 refs.] Washington, D.C. : U.S. Dep. Agric. [In English].

I. Of 400 cultures of paratyphoid bacilli isolated from domestic animals in the United States all but five belonged to one of the known types. Many species of *Salmonella* can infect a variety of species of hosts, *e.g.* fowls can act as reservoirs for certain food-poisoning bacilli pathogenic for human beings.

E. found during a period of four years, in

the course of which 223 salmonella were isolated, that *S. typhi-murium* occurred more frequently than all the other types combined. It was found in 62% of the outbreaks and composed 79% of the cultures studied. A surprising feature was the absence in all of *S. enteritidis*, although this organism has been reported frequently from fowls in Europe.

The rarer types of salmonella occurred in one-third of the cases. Those most frequently encountered were *S. anatum*, *S. newington*, *S. senftenberg*, *S. derby*, and *S. newport*. Most of the types found in fowls produce disease in man, and it is probable that under favourable conditions all of them attack man.

A number of salmonella organisms are transmitted through the egg, the eggs thus forming a dangerous source of infection in fowls. A table showing the distribution of salmonella types in fowls is included.

II. This article gives a general survey of pullorum disease in the United States, and the methods employed to control it.

Both the whole blood agglutination test and the tube agglutination test are employed in the testing and eradication of reactors. The whole blood agglutination test as employed at present is found not to give results that are as satisfactory as those obtained by the tube method. It is suggested that this method could be improved by the use of graduated pipettes for measuring the samples of blood and antigen.—G. C. B.

GARSIDE, J. S., & GORDON, R. F. (1940). **Salmonella Infections of Ducks and Ducklings.**—*J. comp. Path.* **53.** 80–89. 5 tables. [Numerous refs.]

The authors describe an outbreak of paratyphoid infection (" Keel " disease) involving thousands of ducklings. *S. typhi-murium* and *S. enteritidis* were isolated from the affected birds. As a result of breeding experiments and bacteriological examination of the eggs laid by adult carrier ducks, it is suggested that the transmission of the disease *via* the egg may not be the most important factor in the spread of infection [see *V. B.* **1.** 113, and **3.** 180].

The epizoology and the control measures outlined are the same as those previously reported by the authors [*V. B.* **10.** 13].

—S. G. IYER.

EDWARDS, P. R., BRUNER, D. W., & HINSHAW, W. R. (1940). **A New Salmonella Type Isolated from Turkeys: Salmonella california.**—*J. infect. Dis.* **66.** 127–129. 2 tables. [5 refs.]

A new serological type, designated as *S. california*, was isolated from two different outbreaks of paratyphoid infection in turkeys. The antigenic formula of this organism according to the Kauffmann-White classification is IV, XII : g, m, t : — ; it seems to be closely related to *S. oranienburg*.—S. G. IYER.

DE MENDONÇA MACHADO, A. (1938). Études sur la brucellose en Portugal. [**Brucellosis in Portugal**].—*Repos. Lab. Pat. vet., Lisboa.* **4.** 21–64. 11 tables. [Numerous refs.] [In French : English summary].

Between 1930–36, 4,479 agglutination tests were made, 16·7% being positive. 2,006 (9·2% positive) tests were done on cattle serum, 618 (15·5% +) on goat and sheep, and 1,804 (23·7% +) on swine serum. In 1937, 1,250 (11·5% +) were on cattle, 227 (4·4% +) on sheep and goat, and 1,689 (14·1% +) on swine serum.—J. PASFIELD.

SORGE, G. (1938). Attività del centro antibrucellare di Catania. [**Work of the Brucellosis Centre in Catania**].—*Arch. internat. Brucelloses.* **1.** 129–148. 4 graphs. [Numerous refs.] [In Italian].

The centre was founded in 1935 and comprises a research laboratory and a free clinic for outpatients. A report is published yearly on the work done, mostly on human brucellosis. Of 8,247 goats in 28 localities of the province of Catania, 813 gave positive reactions to the intradermal test with brucellin.—E. MARTIN.

OTERO, P. M. (1940). **Brucella Infection in Puerto Rico.**—*Bol. Asoc. méd. P. Rico.* **32.** No. 2. 35–39. [10 refs.] [In English].

Of 528 bovine blood samples taken from dairy herds in Puerto Rico, 58% were positive to the *Br. abortus* agglutination test. The wide discrepancy between high infection in cattle and apparently low incidence in man led O. to investigate the infectivity of ten *Br. abortus*, two *Br. melitensis* and two *Br. suis* strains in 40 persons. Results suggested that infection occurred more readily through abraided skin than by mouth, while the porcine strains were more virulent than the bovine strains by the oral route. The clinical signs of brucellosis in man are described. Strains of *Br. abortus*, which is the prevalent species in Puerto Rico, proved of low virulence for man. A representative bovine strain was atypical in growing well on Petragnani's medium and did not produce a

true infection in the g. pig. 24·7% of the contact group and 4·2% of the general population of San Juan showed cutaneous hypersensitiveness to purified brucella protein.

—R. O. Muir.

Ferreira, A. Á., Sá Viana Conte, H., & de Mendonça Machado, A. (1938). Ácerca das vias de infecção brucelica. [**Methods of Infection in Brucellosis**].—*Repos. Lab. Pat. vet., Lisboa.* **4.** 65–77. 3 tables. [14 refs.] [English and French summaries].

In order to ascertain the possible methods of infection by *Br. abortus*, experiments were carried out on rabbits and g. pigs, all negative reactors to the agglutination test for *Br. abortus*; six strains of the organism isolated from cattle were used. The methods of infection considered most likely in nature were studied. Infection took place *via* the genital organs, the eyes, mouth, nose, intact skin, damaged skin, and by subcutaneous injection. The most severe infections proved to be *via* the nose and damaged skin. The other methods in the order of their importance were *via* the eyes, intact skin, mouth, and genital mucosa.

The effects were also studied of the juices of the bovine rumen, omasum, and abomasum on *Br. abortus*. For various reasons the results with the omasal juices were not conclusive, but in the case of the abomasum bactericidal effects were not noted within 36 hours' contact with the juices and in the case of the rumen it was 48 hours before there was any lethal effect on the bacteria. Bovine saliva had bactericidal effects only after 36 hours' contact.

—Miller Watson.

I. Buck, J. M., Cotton, W. E., & Smith, H. E. (1938). **Vaccination of Calves and Yearlings against Bang's Disease.** —*Tech. Bull. U.S. Dep. Agric.* No. 658. pp. 6. 1 table. [2 refs.]

II. Haring, C. M. (1939). **Results of Vaccination With *Brucella abortus*, Strain 19 in an Infected Herd.**—*J. Amer. vet. med. Ass.* **94.** 587–589. [1 ref.]

III. Hardenberg, J. G. (1939). **Calfhood Vaccination Against Bang's Disease: I. Effect on Agglutinin Titres and Results of First Pregnancies.**—*Ibid.* 478–488. 7 tables. [7 refs.]

I. The authors describe experiments designed to test calfhood vaccination as compared with vaccination of heifers. Thirteen calves about six months old and ten heifers from 12–14 months old were used, six of the former and five of the latter being vaccinated and the remainder serving as controls. A proportion of each group was later severely exposed to contact, and the remainder received conjunctival exposure to infection. A table summarizes the results of the two-year investigation.

One of the *Brucella abortus* vaccines was prepared from strain no. 19 (low virulence for g. pigs) and the other from strain no. 618 (high virulence for g. pigs). Three calves received vaccine no. 19 and three calves and all five heifers received vaccine no. 618. The agglutination titre of all vaccinated animals was high (1 : 2,000) two weeks after vaccination, but it proved to be less persistent in the calves than in the heifers, the difference being most marked (all calves negative, all heifers reacting, one at 1 : 25 and four at 1 : 100) after 13 months, when breeding commenced. None of the vaccinated animals aborted following either form of test exposure, and all were negative to g. pig tests of uterine material and colostrum at the time of calving.

Transmission of the disease was shown to be easier by the conjunctival route (80% of controls) than by 24-hour periods of direct contact with housed aborting animals and their discharges (foetus, etc.).

II. H. details the results of vaccination of calves and heifers 4–12 months old against *Br. abortus* in a self-contained infected dairy herd from 1933–39. The dosage of living *Br. abortus*, strain 19, was 2×10^{10} organisms. No vaccinal organism appears to have been transmitted to any non-vaccinated cows of the herd during the whole period. Seventy-one vaccinated animals produced 146 normal calves. Five abortions and five still births were proved by g. pig tests etc. not to be due to *Br. abortus* infection.

III. The great importance of healthy and immune animals for replacements in any control plan of herds or areas is emphasized. A non-infected purchase may be non-immune, with consequent risk if only a small degree of herd infection exists. Conversely, a negatively reacting cow coming from an infected herd may introduce infection. The number of animals suitable for replacements is still, economically speaking, too small.

This report refers to investigations started in 1935. The herd had been under strict blood testing control since 1928 and vaccination of

heifers had been used to aid this control, especially with a view to reducing the amount of placental disease, *Br. abortus*, strain 19, being used. About 1,200 heifers were vaccinated.

The agglutination records of 625 animals are analysed. High titres of 1 : 6,400 to 1 : 25,000 occurred in about ten days in most cases. Low titres of 1 : 200 to 1 : 400 often developed more slowly (2–3 weeks). About 80% later became negative at a dilution of 1 : 25; 20% reacted at 1 : 50 to 1 : 100 either partially or intermittently and only one heifer (nine months old when vaccinated) continued to be a definitely positive reactor. No permanent infection with strain 19 could be determined in the group (20%) of low titre reactors.

Out of 124 pregnancies, seven abortions, three of which were due to *Br. abortus* infection, occurred in vaccinated heifers. Of 64 pregnancies in control heifers there were four abortions, all due to *Br. abortus* infection.

Disposals of reactors due to natural exposure to infection following vaccination during 1935 amounted to 9·8%, whereas 20·5% of the control group had to be eliminated.

No systematic examinations were made for *Br. abortus* in foetal material and discharges at abortion or parturition, but blood tests were carried out whenever possible from the time the animals were bred.—C. V. Watkins.

Anon. (1940). **A Report on Bang's Disease Vaccinated Heifers in an Infected Herd.**—*Cornell Vet.* **30.** 195–196. 1 table.

The value of calfhood vaccination with live *Brucella abortus* was investigated in a dairy herd, maintained at about 300 head, where monthly testing was carried out and reactors removed. Of 188 home-raised heifers added to the herd during two years, 46 were unvaccinated controls of which 34% became reactors, and 142 were vaccinated heifers of which 8·5% became reactors after exposure to infection. All these animals must have been exposed to a virulent infection, since 189 purchased cows which had been stabled with them were removed from the herd because they also became reactors. It is recommended that purchased cows from abortion-free herds should not be added to infected herds and that the safest source of replacements in an infected herd is home-raised vaccinated heifers.

—R. O. Muir.

McEwen, A. D. (1940). **Immunity to Br. abortus Infection.**—*Vet. Rec.* **52.** 441–444. 2 tables. [6 refs.]

A group of 82 g. pigs were injected intramuscularly with 0·1 c.c. of a fully virulent, CO_2 sensitive *Brucella abortus* strain, and 73 with an aerobic rough strain of low virulence. After 4–12 weeks, both groups of g. pigs together with 84 controls were injected with 10^{-4}–10^{-8} dilutions of a fully virulent aerobic strain of *Br. abortus*. All except one group of the g. pigs were killed four weeks after reinjection, and their spleens cultured aerobically and in the presence of 10% CO_2. The presence of aerobic growth denoted successful reinfection. G. pigs vaccinated with the R strain were found to be more resistant than the controls, but vaccination with the fully virulent strain conferred much greater resistance to infection. A second experiment with 48 test and 48 control g. pigs, in which the interval between the injections was varied from 1–24 weeks, showed that within one week of infection a high resistance had been set up which was even greater after 24 weeks, since nearly half of the g. pigs had sterile spleens.

In the author's opinion, on an analogy with g. pigs, vaccination of cattle with live virulent culture sets up a high resistance to reinfection, and abortion in vaccinated animals is due to infection by the vaccine and not to subsequent exposure to infection. Vaccines of suitable graded virulence are suggested for safe immunization of animals of varying degrees of susceptibility, estimated according to age, condition of the mammary gland at vaccination, and the time interval between vaccination and pregnancy.

—R. O. Muir.

I. Siebenga, J. (1940). Komt brucella-infectie bij het varken in ons land voor? [**Brucellosis in Swine in Holland**].—*Tijdschr. Diergeneesk.* **67.** 71–75.

II. van den Hoeden, J. (1940). Komt brucellosis-suis in Nederland voor? [**Brucellosis in Swine in Holland**].—*Ibid.* 226–230. [English, French and German summaries].

S. refers to the study by Axel Thomsen on porcine brucellosis occurring in Denmark during 1929–32 [*V. B.* **5.** 606] and suggests that the disease may be present in Holland; during that period a great number of pigs were imported from Denmark for breeding purposes, and the infection may have been introduced into Holland in this way. [No factual evidence is given.—Ed.]

II. The author points out that the observations made by Siebenga [see I] do not prove

the existence of the porcine type of brucella in pigs in Holland. Out of 87 brucella strains isolated by the author from man and animals, *Brucella suis* was not present in a single case. In serological tests on 486 slaughter pigs the only reactions were in 16 that gave doubtful positive reactions to brucella. It is suggested that these slight reactions might have been caused by a symptomless infection with *Brucella abortus* derived from cattle, and the author concludes that *Brucella suis* infection does not occur in Holland.—L. TOBBACK.

PÈRES, G., & GRANON-FABRE, P. (1937). Le mélitococcie chez le lapin. [**Natural Infection of Rabbits with** *Brucella melitensis*].—*Rev. prat. Mal. Pays chauds.* **17.** 229–230 and 233.

On a farm on which sheep and goats were known to be infected with *Br. melitensis*, four tame rabbits aborted and two of these died soon after. Intradermal inoculations of brucellin at the base of the ear gave positive reactions. Agglutination titres of two rabbits selected for examination were 1 : 1,280 and 1 : 640. The rabbits appeared to be in good condition, but P.M. examination showed abscess formation in the spleen and liver and other lesions in the axillary lymph nodes, lungs, and uterus, from which *Br. melitensis* was isolated. Cultures were also obtained from the bone marrow of the femur. Sheep which had aborted had been isolated in premises where the rabbits were kept.—S. J. GILBERT.

BOSWORTH, T. J. (1940). **Further Observations on the Wild Rat as a Carrier of** *Brucella abortus*.—*J. comp. Path.* **53.** 42–49. [8 refs.]

With a view to examining the incidence of *Br. abortus* infection in rats under natural conditions, 167 rats from 19 farms, where abortion had recently occurred, were obtained for examination. Two g. pigs were inoculated subcutaneously with an emulsion made from ground-up lymph nodes and organs from each rat. One rat was shown to be harbouring *Br. abortus*. Five of the g. pigs inoculated from five different rats died from *Leptospira icterohaemorrhagiae* infection. Two of the g. pigs presented lesions of generalized tuberculosis which proved to be of the bovine type and fully virulent. There appear to be no previously recorded cases of rats acting as carriers of bovine TB. An experiment was also carried out to test the possibility of setting up *Br. abortus* infection in two cows by exposing their fodder to contamination by artificially infected rats. Exhaustive examination of the two cows did not show that the disease had been conveyed to them by contaminated food.—S. J. GILBERT.

PRIESTLEY, F. W. (1939). **The Intradermal Inoculation of Brucella Abortus as a means of Determining the Approximate Degree of Virulence.**—*Vet. Rec.* **51.** 1423–1424. 1 fig. [2 refs.]

White g. pigs and white rabbits were inoculated intradermally on the back with small doses of various virulent strains of live *Br. abortus*. A reaction developed which took about ten days to reach completion; it started as a mild inflammation with, on the second or third day, a whitish area at the point of inoculation surrounded by an area of intense inflammation. About the sixth day the overlying skin was necrotic, and by the ninth or tenth day there was a slough with exudation of pus. There was little or no reaction to inoculation with relatively large numbers of killed organisms. A non-virulent strain was much less active than a virulent strain.

A relationship was found between virulence and necrotic action on the skin, but a test based on these factors was not as clear cut as the g. pig or toxicity tests, and P. concludes that the skin necrosis test will not be found to be of much practical use.—F. T. BOYLE.

KALMBACH, E. R. (1938). **Botulism, a Recurring Hazard to Waterfowl. With Notes on Recent Outbreaks in the United States, Canada, and Australia.**—*Leafl. Wildl. Res. Mgmt, U.S. Dep. Agric.* No. BS–120. pp. 8. [5 refs.]

This pamphlet contains notes on the incidence and geographic distribution of botulism which has been responsible for many thousands of deaths among ducks and shore birds in the U.S.A. Attention is drawn to the importance of controlling this condition for the perpetuation of the life of waterfowl.

Moderate alkalinity of the water inhabited by the birds may favour the existence of the causal organisms under natural conditions.—S. G. I.

DURANT, A. J. (1940). **Limberneck (Botulism) in Fowls.**—*Circ. Mo. agric. Exp. Sta.* No. 207. pp. 6. 2 figs. [1 ref.]

A general account of the subject.—S. G. I.

KOCHOLATY, W., & HOOGERHEIDE, J. C. (1938). **Studies of the Metabolism of the Strict Anaerobes (Genus :** *Clostridium*) **I. De-**

hydrogenation Reactions by Suspensions of *Cl. sporogenes*.—*Biochem. J.* **32.** 437–448. 7 figs. 4 tables. [10 refs.] [Authors' summary copied *verbatim*].

1. A great number of amino-acids and biologically interesting compounds have been investigated as to their ability to act as hydrogen donators with washed suspensions of *Cl. sporogenes* under the stated conditions. It has been found that many of these compounds could be dehydrogenated, although certain amino-acids are better hydrogen donators.

2. A study was made of the conditions which may influence the results: the age of the culture; the pH of the medium, the composition of the medium; and the pH at which the dehydrogenations were performed.

3. Usually the activity towards different substrates decreases during continued incubation. Some substrates like ethyl alcohol, however, are more rapidly dehydrogenated by older cultures when cultivated on neopeptone.

4. The pH curves for different substrates are completely different and the pH optima for dehydrogenation may vary greatly. Cultivated on neopeptone at pH 7·4 the pH-optimum for *d*-alanine was found to lie at 9·3, for ethyl alcohol at 8·5, for acetaldehyde at 6·7, and for pyruvic acid at 6·0. This indicates that comparison of dehydrogenating potencies must be made with due regard to the pH at which they have been investigated.

5. Marked changes in the pH curves for the different substrates were observed when the bacteria employed were cultivated at a more acid reaction than pH 7·4. In general these curves showed a shifting towards the acid side, indicating an adaptation of the organism, so that these substrates could be attacked more easily at low pH.

6. Addition of glucose to the culture medium not only increased the ability of the organism to use glucose as a hydrogen donator, but also, more markedly, that of ethyl alcohol.

7. The different behaviours of the dehydrogenases acting on *d*-alanine, pyruvic acid or ethyl alcohol towards poisons such as HCN, As_2O_3, NaF, $CuSO_4$ are described.

Fildes, P., & Gladstone, G. P. (1939). **Glutamine and the Growth of Bacteria.**—*Brit. J. exp. Path.* **20.** 334–341. [10 refs.]

Glutamine appears to be markedly indispensable as a growth factor for the growth of group A haemolytic streptococci, but is less indispensable for group B. The view is advanced, without complete proof, that the indispensability or otherwise of glutamine depends upon the power of different strains to synthesize it. There is some evidence for supposing that glutamine is associated with the metabolism of certain other bacteria, including strains of *Bacillus anthracis*, *Proteus* and *Staphylococcus*.—Alfred Eden.

Baudet, E. A. R. F. (1939–40). Sur une dermatomycose du chien produite par *Microsporum* (*Achorion*) *gallinae*. [**A Case of Dermatomycosis in a Dog Due to *Microsporon gallinae***].—*Ann. Parasit. hum. comp.* **17.** 443–446. 8 figs. on 2 plates. [2 refs.]

An illustrated description is given of a case of dermatomycosis in a dog which had been isolated for two months in a yard previously occupied by fowls. The causative parasite was identified by its microscopic and cultural characters as *M. gallinae*, probably derived from infected material in the yard. Experimental infection was successful in three g. pigs and two fowls but not three dogs. The classification of the fungus is discussed.—R. O. Muir.

Kimmelstiel, P., & Easley, C. A., Jr. (1940). **Experimental Botryomycosis.**—*Amer. J. Path.* **16.** 95–101. [4 refs.] [Authors' summary copied *verbatim*].

1. Foreign body granulation tissue was experimentally produced in the intestinal wall of rabbits by implantation of fish bones. 2. If accompanied by a perpetual infection with small numbers of staphylococci, granules are formed which are identified as botryomycotic granules. 3. Botryomycosis, therefore, is believed to be due to a continuous invasion of the tissue with staphylococci. 4. Foreign bodies, such as bones, and so on, provide a way of perpetuating the infection.

DISEASES CAUSED BY PROTOZOAN PARASITES

Deschiens, R. (1936). Perte de la virulence de deux souches d'amibes dysentériques en culture. [**Loss of Virulence in Culture of Two Strains of Dysentery Amoebae**].—*Bull. Soc. Path. exot.* **29.** 576–584. 2 tables. [14 refs.]

The human strain "Anto" of *Entamoeba histolytica* produced infections in five out of 20 kittens after 4–113 days' cultivation. A further 20 kittens, inoculated with the same strain after 302–352 days in culture, all remained free from infection. About 500,000 organisms of sub-cultures 2–4 days old were inoculated into the ileum. The strain "V.d.G.", after 90–170 days' cultivation, did not produce infection in any of ten cats inoculated *per rectum*, or of 13 cats inoculated into the ileum.

D. compares these results with those of MELENEY and FRYE who found the virulence of an American strain to be maintained for nearly six years in culture [see also *V. B.* **10.** 915]. He suggests that differences in associated bacterial flora between his strains and the American one, may account for this difference in virulence.

DESCHIENS, R. (1938). Nouvelle observation de réduction du pouvoir pathogène pour le chat d'une souche d'amibes dysentériques en culture. [**Reduction in Pathogenicity for the Cat of Cultivated Strains of Entamoeba**].—*C. R. Soc. Biol. Paris.* **127.** 939–941. [4 refs.]

D. refers to previous experimental infection [see preceding abstract] of cats with entamoebae of various strains.

Further experiments are now described with a strain of entamoebae (Maroc IV) used between the 56th and 124th days of culture (7th–26th subcultures) and between the 524th and 652nd days of culture (77th–93rd subcultures). About 50% of cats inoculated with the earlier sub-cultures, and 20% with the later subcultures, became infected. D. suggests that modification and ageing of associated bacteria in culture may affect the infectivity of *Entamoeba*.—C. V. W.

STEINFELD, F. U. (1940). **Attempts to Reduce Acquired Atoxyl Resistance in** *Trypanosoma gambiense*.—*Ann. trop. Med. Parasit.* **34.** 45–51. 1 table. [15 refs.]

Attempts were made to reduce the atoxyl resistance of a strain of *T. gambiense*, which had been experimentally rendered resistant, by damaging the covering membrane of the trypanosomes. Exposure to cold, heat, and a number of chemical agents including urea, sodium thiosulphate, and caffeine had no effect, but in the case of four strains exposed to 10% glucose solution for 50 minutes or more prior to each passage, the atoxyl resistance of the strain did return to normal. Later attempts to repeat this method of reducing resistance were, however, unsuccessful.—U. F. RICHARDSON.

BROOM, J. C., & BROWN, H. C. (1940). **Studies in Trypanosomiasis. IV. Notes on the Serological Characters of** *Trypanosoma brucei* **after Cyclical Development in** *Glossina morsitans*.—*Trans. R. Soc. trop. Med. Hyg.* **34.** 53–64. 7 tables. [16 refs.] [For part III, see *V. B.* **10.** 413].

Strains of trypanosomes were examined for serological characters by the red cell adhesion test, immune serum being obtained from infected rats ten days after treatment with Bayer 205. It was found that, after an electro-positive and an electro-negative sub-strain which differed serologically had developed cyclically in *G. morsitans*, the resulting sub-strains gave complete adhesion with both the homologous and heterologous antisera, and that the parent strains gave partial adhesion with the antisera of both cyclical sub-strains. Using other parent strains of *T. brucei* it was found that the cyclical sub-strains of different parent strains were quite distinct from one another. In some cases, where the incubation period in inoculated rats had been prolonged, the sub-strain produced did not exhibit the expected serological type, and it is suggested that relapse strains might have been produced.

When first isolated from tsetse flies, two cyclical sub-strains reacted strongly with anti-sera produced against either, but after six months maintenance in rats no cross-reactions were obtained with recently produced antisera, though each sub-strain gave good red cell adhesion with the original antisera. It is suggested that group and specific antibodies may occur, the antigen to the former tending to disappear with mechanical passage, or that these reacting but non-antigenic groups may be similar to haptens, which react with antibodies, but stimulate their production only when attached to a protein molecule, the hapten determining the specificity of the antigen. This is substantiated by the high lipoid content of trypanosomes, since some haptens are known to be of a lipoid nature. If the lipoid-protein complex is labile, as is suggested by the ease of induction of serological variation, it is not considered impossible that rearrangement might take place, and hence the serological individuality of the strain would be altered, but the hapten might still be able to react with its homologous antibody.

A strain of *T. brucei* was successfully cultivated in developing hen's eggs, and rats were infected from the egg cultures. The serological character of the strain was changed in an irregular manner by cultivation.—U. F. R.

NIESCHULZ, O. (1939). Ueber die Morphologie des Trypanosoma viennei aus Surinam (Niederländisch Guyana). [**Morphology of *T. viennei* from Surinam (Dutch Guiana)**].—*Z. InfektKr. Haustiere*. **55.** 207–216. 3 text-figs., 1 table. [12 refs.]

A study was made of *T. viennei*, the South American strain of *T. vivax*, by utilizing a strain imported to Utrecht in a calf from Paramaribo. Morphologically this strain resembled the classical description of *T. vivax* in its bulbous posterior end, the terminal, or nearly terminal, position of the blepharoplast, the poor development of the undulating membrane and the existence of a free flagellum. Individuals in which the posterior end was sharply truncated were more common than in *T. vivax* infections. Measurements made from the strain after subinoculation into cattle, sheep and goats, gave an average length of 21·5 μ in cattle, 21·7 μ in sheep and 22·7 μ in goats, but the number of animals used was not sufficient to justify a conclusion that the host species influenced the size of the parasites. These measurements are compared with those given by various authors for the average length of *T. vivax*, in which a variation of 21·0μ–24·1 μ occurs, and it is concluded that there is no constant difference in size between *T. viennei* and *T. vivax*.—U. F. RICHARDSON.

HOGUE, M. J. (1939). **Infections of *Trichomonas foetus* in Chick Embryos and Young Chicks.**—*Amer. J. Hyg.* Sect. C. **30.** 65–67. [4 refs.] [Author's summary copied *verbatim*].

1. Chick embryos were inoculated with *T. foetus* via the chorio-allantois. Later it was recovered from the digestive tract, gall bladder and yolk sac of the older embryos.

2. Four embryos inoculated with *T. foetus* have hatched as normal chicks. One was positive for *T. foetus*; three were negative.

3. *T. foetus* lived in the eggs from 6 to 7 days after the embryos had died.

4. Unsuccessful attempts were made to infect young chickens with *T. foetus*.

LEVINE, N. D., & BRANDLY, C. A. (1940). **Further Studies on the Pathogenicity of *Trichomonas gallinae* for Baby Chicks.**—*Poult. Sci.* **19.** 205–209. 2 figs., 1 table. [10 refs.]

The authors describe a disease of the upper digestive tract of young chicks, characterized by dry, caseous, multiple foci on the mucous membranes of the crop and oesophagus, and caused by *T. gallinarum*.

To assess the pathogenicity, chicks were fed with cultures of this organism under both natural and experimental conditions. No lesions developed in eight White Rock chicks when cultures were placed in their drinking water. In further experiments, chicks were exposed to infection in the following ways:– (1) *per os* with 1 c.c. of a 48-hour culture containing abundant trichomonads; (2) by scarifying the upper oesophageal wall with a small test tube brush before giving the culture *per os*; (3) by feeding a rich suspension of trichomonads direct from lesions of experimentally infected quail, and (4) by dosing *per os* with two 1 c.c. doses of rich culture which had had 49 transfers on artificial media.

These experiments appeared to indicate that baby chicks are very resistant to experimental infection *per os*. Only in the chicks of group (2) were lesions of trichomonads observed on subsequent examination. Later experiments, however, demonstrated that chicks of the same breed but from a different source could easily be infected even by feeding smaller doses and without excoriation of the oesophagus. The authors conclude that other debilitating diseases and individual differences in resistance have a marked effect on the development of the infection.—C. G. BRANDER.

I. HEGNER, R., & WOLFSON, F. (1939). **Tissue-Culture Studies of Parasites in Reticulo-Endothelial Cells in Birds Infected with Plasmodium.**—*Amer. J. Hyg.* Sect. C. **29.** 83–87. 1 table. [9 refs.]

II. HEWITT, R. (1939). **A Staining Technic for Demonstrating Avian Malaria Parasites in Tissue Sections.**—*Ibid.* 115–117. [5 refs.]

III. BOYD, G. H. (1939). **A Study of the Rate of Reproduction in the Avian Malaria Parasite, *Plasmodium cathemerium*.**—*Ibid.* 119–129. 3 figs., 3 tables. [11 refs.]

IV. HUFF, C. G. (1939). **Relations between Malarial Infections and Body Tempera-**

tures in Canaries.—*Ibid.* 149–154. 1 fig. [11 refs.]

I. Parasites are frequently present [see *V. B.* **9.** 840.] in the reticulo-endothelial cells of birds infected with malaria. The authors have tried, without success, various experimental methods of separating the two forms.

Tissue-culture experiments with a strain of *P. cathemerium* are now described. Tissues of infected canaries were thoroughly washed to remove as much blood as possible, and were then cultivated *in vitro* for eight days, the culture medium being changed twice. These tissues were then inoculated intramuscularly into three canaries, which became infected after prepatent periods of seven and eight days. Taking into account the route of inoculation, such prepatent periods are considered to be those which would result from a large infecting dose, which is presumptive evidence that the infection was produced by the tissue parasites, and not by plasmodia in the few erythrocytes remaining in the cultures.

As plasmodia in drawn blood may remain viable for some time, however [see *V. B.* **8.** 22.] the evidence is not considered conclusive, and no decision is reached.

II. Tissues are fixed in Zenker-formalin solution. Sections are treated with 2·5% potassium bichromate for ½–1 hour, then placed in a modified Giemsa staining solution for 24 hours before mounting as usual. The fully developed red cells stain deep orange and the parasites within them stain blue.

III. B. describes statistically observations on the course of infection in canaries infected with *P. cathemerium*, the number of merozoites produced by each schizont in the process of reproduction, and the rate of destruction of the parasites. The very rare occurrence of an odd number of merozoites from a reproducing schizont is discussed. The largest groups of merozoites are formed by schizonts in the initial stages of the attack. To overcome difficulties in counting the merozoites within the erythrocytes, B. recommends treatment of the blood smear, soon after preparation, with ether or chloroform to haemolyse the red blood corpuscles. He compares some of the observations, presented in this paper, with those described by Taliaferro [*V. B.* **8.** 425.] and discusses certain differences found.

IV. Canaries were infected with two strains of *P. cathemerium*, and two of *P. relictum*, and temperature readings were made by inserting thermocouples deeply into the pectoral muscles. The mean body temperature for the canary was found to be 41·73°C. ± 0·24. Significant differences were found between the nocturnal and diurnal temperatures in both infected and uninfected birds. The temperature rises rapidly when a bird is wakened and the rate of this rise in normal birds was found to be as high as 0·12°C. per minute. Paroxysmal temperature rises, similar to those in malarial infections in mammals, did not occur in these canaries.—S. G. Iyer.

Herman, C. M. (1939). **Temporary Infections with *Plasmodium circumflexum* in Splenectomized Chicks.**—*Amer. J. trop. Med.* **19.** 595–598. [3 refs.] [Abst. from author's summary].

Attempts were made to infect splenectomized chicks with *P. circumflexum*. Splenectomy did not noticeably reduce the natural resistance of these birds to infection.

Salhoff, S. (1939). Kokzidiose beim Reh. **[Coccidiosis in Roe Deer].**—*Berl. Münch. tierärztl. Wschr.* Aug. 25th. 537–538. [7 refs.]

A general paper describing a fatal attack of coccidiosis in an 11-month-old buck. The organisms resembled *Eimeria zürnii*, but were not finally identified.—A. L. Wilson.

Niemand, H. G. (1940). Der Stand der heutigen Forschungsergebnisse über die sogenannte " Stuttgarter Hundeseuche". **[The Present Position with Regard to the So-Called Stuttgart Disease in Dogs].**—*Tierärztl. Rdsch.* **46.** 1–6 and 13–16. [Numerous refs.]

A general discussion on the subject. It is stated that the condition cannot be diagnosed on the basis of clinical symptoms alone.

Suggested methods of transmission are by :– (1) rats ; (2) infection from shallow water and pools, in which the causal organisms can live as saprophytes ; (3) reciprocal infection from dog to dog, human being to dog and *vice versa* (in this connexion several cases are quoted in the article) ; (4) infection from certain hunting dogs, which should be examined serologically to detect possible carriers, and (5) infection from animals other than dogs, *e.g.* pigs, silver foxes and cats, from which *Leptospira* has been isolated.

N. has observed that the number of cases increased, as did also the excretion of the organisms in the urine, during the winter months. This may have been due to increased migration of rats into the towns during the cold

weather, or to lowered canine resistance from insufficient sunlight and some vitamin deficiency.

The following technique is recommended for diagnosing the condition :- (1) serological examination of the blood; (2) dark ground examination of centrifuged urine for leptospirae; (3) injection of blood or urine into g. pigs with subsequent cultivation and isolation of the organisms; (4) examination of stained blood smears, and (5) estimation of the urea content of the blood. It is stated that the urea content of the blood is increased in Stuttgart disease, and that when this is 120 mg. per 100 c.c., the prognosis is doubtful, but when it is 500 mg. per 100 c.c. the prognosis is grave. The latter test is valuable in diagnosing symptomless forms in which the organisms are excreted in the urine for long periods.

The icterus seen in some forms of the disease may be of either the toxic or retention type. Suggested treatment is to increase the resistance of the liver by increasing its glycogen content. This may be effected by parenteral administration of glucose. Insulin is contra-indicated since this increases muscle glycogen at the expense of liver glycogen. Proteins should be fed very sparingly as they also decrease liver glycogen. Trypaflavine treatment is recommended [see *V. B.* **8.** 216. pt. VI.].—A. L. W.

KLARENBEEK, A. (1938). Klinische Statistik der Leptospirosen des Hundes. **[Clinical Statistics of Leptospirosis in Dogs].** —*Zbl. Bakt. I. (Orig.).* **142.** 83–86. 1 table.

A review of 151 cases in dogs of all ages, of which 38% were cases of *L. icterohaemorrhagiae* and 62% of *L. canicola* infection. The former occurred in male and female dogs in the ratio of 3 : 2, and the latter in the ratio of 10 : 2. *L. icterohaemorrhagiae* infection ran an acute course, usually accompanied by icterus and uraemia. *Leptospira* was present in the urine in 26% of cases and the mortality rate was over 50%. *L. canicola* infection ran a more chronic course, with frequent uraemia and digestive disorder. Icterus rarely occurred. The organisms were present in the urine in 59% of cases, and the mortality rate was only 41%.—V. C.

NIESCHULZ, O., & BOS, A. (1940). Versuche mit Mücken und Geflügelspirochäten. **[Research on Mosquitoes as Vectors of Fowl Spirochaetes].**—*Zbl. Bakt. I. (Orig.).* **145.** 258–261. 2 tables. [2 refs.] [Abst. from authors' summary].

Work was done to find out whether mosquitoes could act as vectors of avian spirochaetes. Three attempts at immediate transmission with 75 *Aedes aegypti* were negative. In a fourth test with 25 *A.a.* the fowl acquired immunity. Tests with 464 *Culex pipiens*, which were injected into fowls 2–20 days after feeding on infected birds, gave negative results. Spirochaetes lose their virulence very quickly and do not develop in mosquitoes. Some of the fowls from the negative experiment proved later to be immune. Tests with *A.a.* and *Theobaldia annulata* gave similar results. Mosquitoes, therefore, play no part in the transmission of avian spirochaetes.

DISEASES CAUSED BY VIRUSES

MAGNUSSON, H. (1939). Bestående förändringar efter genomgången mul- och klövsjuka av betydelse i rättsfall. **[Changes in Cattle which have Passed through Foot and Mouth Disease and their Forensic Significance].**—*Skand. VetTidskr.* **29.** 1155–1168. 6 figs. [4 refs.] [English summary].

Internal signs of previous F. & M. disease, only apparent on P.M. examination, include the presence of cicatricial connective tissue strands running through the myocardium, old haemorrhages or necrotic foci in the skeletal muscles most commonly of the thigh, and scabs or ulcers in the mucous membrane of the rumen.

External changes include healing or healed lesions of the oral mucous membrane, these being often unpigmented and therefore striking in appearance; similar marks occur on the teats. Overgrowth of the coat and failure to cast it in the spring, and fissures round the claw horn are also signs.

A case record of forensic interest is given. Fourteen out of 21 animals in a herd, in which F. & M. disease had not been reported, showed grooving of the claws and three showed unpigmented dental pad areas, from which it was considered that the herd had passed through the disease a few months earlier.

Another way of diagnosing recent infection is the complement fixation test; it is reliable up to about six weeks after recovery.—J. E.

JACOTOT, H. (1939). Contribution à l'étude de la vaccination contre la peste bovine

au moyen de vaccins organiques desséchés. [**Vaccination against Rinderpest by Desiccated Organ Vaccine**].—*Rec. Méd. vét. exot.* **12.** 129–146.

J. briefly reviews previous work on dried vaccines, which had shown that dried spleen pulp retained its antigenic properties for longer periods than the formol and toluene liquid vaccines. Nevertheless the liquid vaccines were easier to prepare and handle, and in Indochina had not been replaced in practice by the dried vaccines.

In an extensive series of observations J. compared the efficiency and duration of immunity evoked by a number of vaccines after storage at various temperatures. Dosage of emulsions of dried vaccines was arranged so that these would contain amounts of the original spleen tissue equivalent to those contained in the liquid vaccines.

Dried spleen vaccines were compared with liquid formol and toluene vaccines and with a dried formolized vaccine. In one series the animals were tested first with two weak doses of virus (2 c.c. of virulent blood diluted 1 : 1,000) at weekly intervals, and then with 2 c.c. of virulent blood (undiluted). J. notes that, in his experience, some animals will resist a feeble dose of rinderpest virus while they will not resist a large dose.

The fluid obtained by coarse filtration of the formol saline spleen suspension in the preparation of the dried formol vaccine was also tested, but was found to have little or no value as a vaccine.

To summarize the large number of detailed conclusions from this work is difficult, but in general, it may be said that the dried vaccines gave good results. The dried formol vaccine showed definite superiority over the liquid formol vaccine and kept better at room temperature than did the latter at 6°C., but it was not superior to the liquid toluene vaccine. Immunity evoked by the dried vaccine was of similar duration to that following inoculation with toluene vaccine, but was maintained perhaps a little more regularly. It was of longer duration than that set up by the formol vaccine.

A practical difficulty with the dried vaccine was the formation of clumps when making the emulsion for injection.—H. E. Harbour.

Beck, C. E., & Wyckoff, R. W. G. (1938). **Venezuelan Equine Encephalomyelitis.** —*Science.* **88.** 530. [5 refs.]

A preliminary account of research on virus obtained from the brain of a horse dying of encephalomyelitis in Venezuela. The virus was found to be highly pathogenic for g. pigs, mice, and chick embryos, the symptoms resembling those caused by the Eastern type of E.E. virus.

The Venezuelan virus was found to be virulent in a dilution of 10^{-7} which is 10–100 times higher than the potency of Eastern type E. E. virus. G. pigs were successfully immunized against the Venezuelan virus by homologous formalinized virus vaccine. In immunological tests with the Western and Eastern types of virus, the Venezuelan virus proved to be distinct.—J. E.

Shahan, M. S., Giltner, L. T., & Osteen, O. L. (1940). **The Isolation and Typing of Equine Encephalomyelitis Virus.**—*Cornell Vet.* **30.** 151–160. [16 refs.]

Material for isolation and typing of E.E. virus should be collected as soon as possible after death from typical but not protracted cases of the disease. Virus ordinarily occurs in the blood in the early stages only and not in the later stages. Later the greatest concentrations are found in the base of the brain and in the anterior cervical cord. G. pigs are used as the test animals, usually by the intracerebral route, and in practice have been more successful for the purpose than chick embryos. Of 267 specimens taken from suspected cases during the years 1932–39, virus was recovered from 66, while 68 others displayed pathology typical of the disease. All 66 strains of virus recovered by the authors, and also numerous other strains, have been shown to be either Eastern or Western types.—D. D. Ogilvie.

Tyzzer, E. E., Sellards, A. W., & Bennett, B. L. (1938). **The Occurrence in Nature of "Equine Encephalomyelitis" in the Ring-Necked Pheasant.**—*Science.* **88.** 505–506. [2 refs.]

A description of work on brain material obtained from three pheasants which were found moribund in a part of Connecticut. The brains of the birds appeared rather soft and otherwise normal, but as the birds had shown signs of paralysis, tests were carried out in order to detect a brain virus. For this purpose Swiss mice were injected intracerebrally with the pheasant brain suspension, and g. pigs were infected by subcutaneous and intraperitoneal inoculation. As the mice and g. pigs reacted like those infected with E.E., immunological

tests were carried out with mice treated with encephalomyelitis immune serum (Eastern type). Mice so treated and infected with pheasant's brain remained well, so the pheasant brain virus was assumed to be the Eastern type E.E. virus.

A few tests were made on the susceptibility of other birds to the pheasant virus. Some quail and some Rhode Island Red chicks were artificially infected and died after showing symptoms similar to those of the pheasants.

It is suggested that birds may play a part in the epidemology of E.E.—J. E.

I. Schoening, H. W., Giltner, L. T., & Shahan, M. S. (1938). **Equine Encephalomyelitis Produced by Inoculation of Human Encephalitis Virus.**—*Science.* **88.** 409–410. [9 refs.]

II. Howitt, Beatrice. (1938). **Recovery of the Virus of Equine Encephalomyelitis from the Brain of a Child.**—*Ibid.* **88.** 455–456. [7 refs.]

I. A sample of a filtrable virus recovered from the brain of a child dead of encephalitis was inoculated intracerebrally into three horses —one normal, one immune to Eastern type E.E., and one immune to the Western type. Six g. pigs were also inoculated in the same way. The normal horse and the horse immune to the Western type died of acute encephalomyelitis, but the horse immune to the Eastern type remained normal. All the g. pigs developed typical encephalomyelitis.

The child's brain virus proved to be identical with Eastern type E.E. virus and it is assumed that the child had died of infection with this virus.

II. A description of work on a virus obtained from the brain of a 20-month-old boy dying of acute encephalitis in California. The virus was passaged through Swiss mice and further through monkeys, g. pigs, rabbits, and rats. All these animals developed a disease similar to E.E. The virus of E.E. was, therefore, suspected as the cause of death in the child. This was found to be the case by appropriate cross-immunity tests. The Western type of virus was involved.—J. E.

McAdams, J. C., & Porter, J. E. (1939). **Encephalitis in Man Caused by the Virus of Equine Encephalomyelitis. Report of a Case in an Adult.**—*New Engl. J. Med.* **221.** 163–166. 2 figs., 1 chart. [10 refs.]

A report of a case of encephalitis in an adult in which the aetiological agent was isolated and proved to be identical with that of the virus of the Eastern type of E.E. The authors believed this to be the first reported case in an adult human being of proven infection with this virus.—J. E.

—. (1940). **Infectious Equine Encephalomyelitis in the United States in 1939.**—*—Publ. Hlth Rep., Wash.* **55.** 601–602. [4 refs.] [Abst. from summary].

Attention was recently focused on equine encephalomyelitis by the outbreak in Massachusetts in 1938, in which human cases of encephalitis also occurred [see preceding abst.]. Of 38 suspected human cases investigated, 8 were confirmed and 5 of these, occurring within 15 miles of one another, were contracted in the area in which the equine disease was prevalent. There was no indication of human contact infection in these cases. Mosquitoes were reported to have been unusually prevalent at the time of the outbreak.

In 1939, only 8,008 cases in horses were reported in the U.S.A. as against 184,662 in 1938. In 1939 there were 2,471 deaths from the disease, giving a case rate of 1·1 per 1,000 animals (horses and mules) in the affected counties and a case fatality of 30%. Every state west of the Mississipi river was involved and approximately one-third of all the counties or parishes in the entire country reported infected animals. The case fatality rate for the Eastern type of virus was apparently more than three times as high as that for the Western type. As in previous years over 90% of the cases occurred during the summer or early autumn. The reported incidence in vaccinated and unvaccinated horses and mules was 0·37 and 1·2 respectively per 1,000 animals. Three million horses and mules—about one-fifth of the total in the U.S.A.—were vaccinated, but some were undoubtedly in the incubation stage of the disease when so treated.

de Gier, C. J. (1940). De prophylaxis bij Varkenpest. [**Prophylaxis of Swine Fever**].—*Tijdschr. Diergeneesk.* **67.** 209–226. [English, French and German summaries].

Prophylaxis against S.F. includes :– (1) legal measures ; (2) serum prophylaxis, and (3) serum-virus immunization and immunization with vaccines. These are discussed with special reference to conditions in Holland. As the

Dutch herds are generally strongly graded up and therefore very susceptible to S.F., it is advisable to carry out serum-virus immunization only under very special circumstances, where undue risks can be avoided. Immunization with attenuated or killed virus (formol vaccine) is usually preferable. In the four years during which formol vaccine has been prepared by the State Serum Institute, more than 2,000 litres have been delivered. This vaccine has generally given good results, but in some cases the immunity conferred has been insufficient. —L. Tobback.

I. —. (1939). Renseignements transmis par le gouvernement du Reich sur l'état de la rage pendant l'année 1938. **[Rabies in Germany in 1938]**.—*Bull. Off. internat. Epiz.* **18.** 343–345. 1 graph.

II. —. (1939). La rage en Tchécoslovaquie pendant l'année 1938. **[Rabies in Czechoslovakia in 1938]**.—*Ibid.* 346.

III. —. (1939). La rage en Yougoslavie pendant l'année 1938. **[Rabies in Yugoslavia in 1938]**.—*Ibid.* 347–348. 1 table.

I. In 1938 rabies was diagnosed in 55 districts which marks a low point in the incidence of the disease. It was most prevalent in March and least prevalent in November. The monthly incidence is illustrated in a graph. More cases occurred in Prussia than elsewhere. Control was solely by veterinary police measures and no preventive vaccinations were carried out. Rabies was notified in 14 districts in Austria during the year.

II. A table shows that rabies occurred in 39 districts, affecting 68 dogs and seven other animals. One case of human rabies occurred among 75 who were bitten.

III. Rabies occurred in 227 districts affecting 1,014 animals—including 122 pigs, 165 cattle, 32 sheep, 28 solipeds, 45 cats, and 9 goats. In addition, two rabid wolves were observed. [See also *V. B.* **10.** 421.]—L. Tobback.

Lépine, P., Mathis, M., & Sautter, V. (1939). Sur quatre souches de virus rabique des rues, originales de l'A.O.F. **[Four Strains of Street Rabies Virus from French West Africa]**.—*Bull. Soc. Path. exot.* **32.** 852–856. [6 refs.]

In order to determine whether the disease known as *oulou fato* occurring in dogs in French West Africa is a special form of rabies, four strains of virus from cases of this disease which were isolated at the Pasteur Institute at Dakar were tested for virulence at Paris. It was found that they were typical street rabies virus and of high virulence.—L. Tobback.

Domański, E. (1938). Występowanie zarazka swoistego i bakterii widzialnych w centralnym systemie nerwowym, toksyczność mózgu przy postaci nerwowej nosów kipsów. **[Presence of the Virus and of Bacteria in the Central Nervous System, and the Toxicity of the Brain in the Nervous Form of Distemper in Dogs]**.—*Wiad. weteryn.* **17.** 237–250. 1 table. [Numerous refs.] [German summary].

The nervous form of distemper can occur without previous affection of the respiratory or digestive tracts. Out of ten dogs, inoculated subcutaneously with brain emulsion from dogs with the nervous form of distemper, only two developed distemper (catarrhal form); one of these had been inoculated with material from a primary nervous form of distemper, and the other from a case in which the nervous manifestations were a complication. D. states that in the nervous form the virus does not seem to be often present in the brain tissue. He succeeded in producing a nervous form experimentally in only one case; this was in an animal which had received an intraspinal injection of cerebrospinal fluid from a dog with catarrhal distemper. The brains of 20 dogs with the nervous form of distemper were examined bacteriologically and streptococci, slightly pathogenic for white mice, were present in 15 cases. Streptococci were isolated from the meninges in one case; the C.S.F. was always sterile. Bacteria were also found in the experimental nervous case; D. considers that these bacteria play an important role in the development of nervous symptoms. Brains from the catarrhal form never showed any micro-organisms. Formolized brain emulsion from catarrhal cases, injected subcutaneously, produced no reactions. If a similar emulsion from nervous cases was injected into healthy dogs, it led to local swellings; when it was injected into dogs already infected with the nervous form of distemper, the condition was aggravated.—V. Chládek.

Coronel, A. B. (1939). **Studies on Fowl Pox Immunisation**.—*Philipp. J. anim. Indust.* **6.** 239–246. [2 refs.]

As a vaccine, C. used a glycerin saline emulsion of fowl-pox virus. No difference was discernible in the immunizing value of the

vaccine with varying concentrations of virus. The efficacy of the different methods of vaccination was investigated, and C. found that the stick method, inoculating into the flank, was the best. Attention is drawn to the danger of vaccinating chicks under one month old, especially day-old chicks. Where pigeon-pox virus is advocated as a vaccine against fowl pox in chickens, C. recommends double vaccination, *i.e.* inoculation with pigeon-pox virus first, followed by fowl-pox virus ; this was found to reinforce the diminishing immunity which occurred in birds about three months after vaccination with pigeon-pox virus [see also *V. B.* **10.** 929].—S. G. Iyer.

Iyer, S. G. (1939). **Paralysis in a Pigeon due to Doyle's (Ranikhet) Disease Virus.**—*Indian J. vet. Sci.* **9.** 379–382. 4 figs. on 1 plate, 1 table. [4 refs.]

A natural case of Newcastle disease in a pigeon is described. The pigeon was the only one of an isolated lot of birds which developed the disease. Marked paralysis of the wings and whitish diarrhoea characterized the condition. Autopsy revealed intestinal congestion and slight splenic enlargement. Spleen filtrate injected into healthy fowls caused disease through several passages. All of four pigeons inoculated simultaneously contracted the disease, and following paralytic symptoms, two succumbed.—D. D. Ogilvie.

I. Olitsky, P. K., & Bauer, J. H. (1939). **Ultrafiltration of the Virus of Infectious Avian Encephalomyelitis.**—*Proc. Soc. exp. Biol., N.Y.* **42.** 634–636. 1 table. [9 refs.]

II. Kligler, I. J., & Olitsky, P. K. (1940). **Experiments on Cultivation of Virus of Infectious Avian Encephalomyelitis.**—*Ibid.* **43.** 680–683. 1 table. [7 refs.]

I. Virus, as contained in brain emulsion of experimentally infected fowls, was found to pass through gradocol membranes having APD of 73 mμ and more, and not 60 mμ. By applying the Elford formula, the size of the virus particle was estimated to be in the range of 20–30 mμ.

II. In an attempt to obtain large quantities of bacteria-free virus the authors inoculated the developing chick embryo. Contrary to the results obtained with certain other viruses, it was found that, whilst hatched chicks are susceptible to infection with the virus, embryonic chicks are apparently unsusceptible. It is, therefore, considered that the disease may not be egg-borne [see also *V. B.* **9.** 711].

In tissue culture experiments the authors claim that multiplication of the virus was obtained only under certain conditions in minced whole embryo tissues.—S. G. Iyer.

van Roekel, H., Bullis, K. L., & Clarke, M. K. (1939). **Infectious Avian Encephalomyelitis.**—*Vet. Med.* **34.** 754–755. [5 refs.]

This is a semi-popular article, affording practical information on the nature and the control of the disease. Birds which either apparently recover or run a chronic form of the disease with ataxia and tremor in varying degree, may attain heavy egg-production and produce normal progeny. Turkey poults and ducklings are susceptible to the disease on inoculation, but white mice, rabbits, g. pigs, mature pheasants and sparrows were found refractory.—S. G. Iyer.

Gerlach, F. (1938). Psittakose. **[Psittacosis].**—*Rep. 13th int. vet. Congr. 1938.* **2.** 874–881. [In German : English, French and Italian summaries. Discussion p. 881 in German]. [Author's English summary copied *verbatim*].

Psittacosis is not always a serious or fatal disease in man and birds. Cases of short duration and which terminate in recovery occur frequently in man and birds. Germ carriers, namely individuals that do not exhibit clinical symptoms of psittacosis, are known to exist among men, parakeets, native birds and white mice. In a case of this kind it was possible to disclose the virus for 75 days by using the sputum for research work. The danger to the community of such subjects was demonstrated.

The corpuscles Levinthal-Coles-Lillie which are considered as the causative agent of the disease have the same pathogenic importance as the Negri bodies have in rabies.

The importance of utilizing the white mouse for diagnostic experiments in psittacosis has been demonstrated by Krumwiede, McGrath and Oldenbusch ; it has been of specially important use in the diagnosis of latent cases in man and animals.

Finally, the author reveals the research work done in Austria during the last three years as to the prevalence of the disease, the period of incubation, experimental diagnosis, morbidity, mortality and sources of infection.

I. Stevenson, W. D. H., & Butler, G. G. (1939). **Studies on the Cultivation of Vaccinia on the Chorio-Allantoic Membranes of Chick Embryos.**—*Rep. publ. Hlth med. Subj., Lond.* No. 87. pp. 185. 27 tables, 6 charts, 7 appendixes. [Numerous refs.]

II. Thompson, R. L., & Coates, Margaret S. (1939). **The Cultivation of Vaccinia Virus in Deep Columns of Maitland Medium.**—*J. infect. Dis.* **64.** 105–109. 4 tables. [12 refs.]

III. Downie, A. W. (1939). **The Immunological Relationship of the Virus of Spontaneous Cowpox to Vaccinia Virus.**—*Brit. J. exp. Path.* **20.** 158–176. 13 tables. [Numerous refs.]

IV. Downie, A. W. (1939). **A Study of the Lesions Produced Experimentally by Cowpox Virus.**—*J. Path. Bact.* **48.** 361–379. 13 figs. on 4 plates. [Num. refs.]

I. The present methods of preparing vaccine lymph from calves or sheep are quite satisfactory, but the reduction of bacterial contamination by prolonged storage in glycerin may lead to some impairment in potency. Virus propagated on the egg membrane is free from this objection. The authors describe special apparatus for the inoculation of the eggs, for the collection of infective material, and for the subsequent treatment of the membranes to prepare suspensions suitable for vaccination.

No difference in the character of the lesions was noted during 100 passages on egg, and there was no apparent diminution in potency. When tested on rabbits, culture virus was of high value, but some loss in infectivity was noted at about the 55th passage. Between the 24th and 55th transferences, a 1 : 100 dilution of chick membrane gave a similar response to a 1 : 1,000 dilution of calf lymph.

In experimental animals both calf lymph and chick membrane virus failed to produce generalized lesions following intradermal inoculation, whereas a widespread organic response could be induced by the intravenous route. Attempts to produce an encephalomyelitis by the intracerebral inoculation of rabbits and monkeys were unsuccessful. In the few tests which were carried out immunity persisted from 7½ months to 2½ years.

II. The *in vitro* cultivation of vaccine virus by the Maitland-Laing method may be unsuccessful if the depth of the fluid exceeds 2 mm. The authors show that the amount of tissue present is of importance and that good multiplication can be obtained in deep tubes if the proportion of tissue to liquid is very small. [See also Rivers and Ward (*V. B.* **3.** 622)].

Increasing oxygen tension failed to enhance the growth of the virus, while decreasing the tension by excluding air inhibited growth. The oxidation-reduction potential of the system is probably the determining factor in the growth of the virus.

III. Two strains of cow pox virus, one isolated from a farm hand and one from typical lesions of a cow, were compared with two strains of vaccinia by neutralizing tests, by agglutination of elementary bodies (E.B.) and by complement fixation in the presence of specific soluble substance. The sera were obtained from rabbits recovered from a dermal infection and subsequently injected with suspensions of E.B.

Applications of the viruses to the skins of recovered rabbits failed to indicate any immunological differences between cow pox and vaccinia, but the results of experiments on mixtures of virus and antiserum suggested slight distinctions. Ordinary complement-fixation and agglutination tests failed to show antigenic differences between the two cow pox strains; this was confirmed by tests with absorbed sera. When compared with vaccinia, however, it was found that each unabsorbed serum showed a relatively higher titre with the homologous than with the heterologous serum, suggesting minor differences between cow pox and vaccinia. The E.B. of each strain absorbed the antibodies for both viruses from its homologous serum and its own antibodies from the heterologous serum, while only a partial reduction in titre for the other virus was effected by absorption of heterologous serum. The qualitative differences seemed to be related to the heat labile antigens.

IV. D. studied the lesions produced on the chorio-allantoic membrane by the four strains used above, together with two further viruses. In addition, the histological appearances of infected g. pig pads and dermal lesions in rabbits were examined in detail.

Cow pox strains evoked an extensive proliferation of ectodermal and mesodermal cells with haemorrhage in the egg, and induced a marked oedema and hypertrophy of the skin in animals. The inclusion bodies of cow pox contained innumerable E.B., which are regarded as colonies of virus held together by an extensive

matrix responsible for the specific staining affinities. In vaccinia, on the other hand, cellular necrosis was more marked and occurred at an earlier stage. The acidophilic material was related mainly to the E.B. and not to the matrix, which was relatively scanty. In cow pox lesions inclusion bodies were frequently seen in cells of mesodermal origin, whereas they were much less common in vaccinia. The tendency for cow pox virus to attack the endothelial cells of blood vessels probably accounted for the haemorrhage which was a distinctive feature. After repeated passage the cow pox strains were not transformed into vaccinia.

[Recent work has suggested that cow pox is a disease *sui generis*, while many authorities hold the view that some of the strains of vaccinia maintained in institutes devoted to the production of vaccine lymph are varieties of variola virus adapted to the bovine animal. In any case, the established strains of vaccinia have probably become permanently modified as a result of prolonged artificial propagation in sheep, rabbits, etc., and it is not surprising that they should present differences from cow pox virus.]—R. E. Glover.

Himmelweit, F. (1938). **Observations on Living Vaccinia and Ectromelia Viruses by High Power Microscopy.**—*Brit. J. exp. Path.* **19.** 108–123. 1 text-fig., 20 figs. on 2 plates. [15 refs.] [Author's summary copied *verbatim*].

A method is described by which the living chorio-allantoic membrane may be examined microscopically by annular oblique incident illumination whilst it is still *in situ* in the egg, and with its vascular and other anatomical connections still undisturbed.

The method has been applied to the study of virus bodies within the living cells of the chorio-allantoic membrane of the duck egg infected with ectromelia and vaccinia viruses.

Observations on the nature of the ectromelia inclusion body are reported, and the formation of extra-cellular giant aggregates is described.

The presence and distribution of vaccinal elementary bodies within the living cell has been observed from early stages of cell infection. The elementary bodies, as they exist in the cell, are contained within a matrix of low viscosity and their partial release in " extrusion bodies " is described.

It is concluded that the vaccinal elementary body represents the only true virus structure which can be recognized in the living cell, and that the Guarnieri bodies, seen in stained preparations, correspond simply to localized irregular collections of elementary bodies, and do not necessarily represent all the virus in the cell.

Armstrong, C., Wallace, J. J., & Rose, L. (1940). **Lymphocytic Choriomeningitis. Gray Mice, *Mus musculus*, a Reservoir for the Infection.**—*Publ. Hlth Rep., Wash.* **55.** 1222–1229. [9 refs.] [Authors' summary copied *verbatim*].

1. Two additional proven cases of choriomeningitis are reported from the District of Columbia, making a total of 4, all from homes harboring gray mice which proved to be active carriers of the virus of this disease.

2. A total of 303 gray mice trapped from 76 different homes in different sections of Washington, D.C., were examined and 64 of them were found to be active carriers of choriomeningitis virus.

3. The 64 infected mice were from 34 different homes from which a total of 122 mice was examined. Thus 52 percent of the mice from these homes were harboring choriomeningitis virus.

4. A total of 62 mice from 22 homes harboring infected mice were inoculated intracerebrally with 10 to 15 M.L.D. of choriomeningitis virus, of which 41, or 66 percent, proved to be immune.

5. Gray mice are believed to be an effective reservoir for the virus of choriomeningitis from which man may become infected.

Markham, F. S. (1938). **A Study of the Submaxillary Gland Virus of the Guinea Pig.**—*Amer. J. Path.* **14.** 311–321. 6 figs. on 1 plate, 1 table. [15 refs.] [Author's summary copied *verbatim*].

1. The characteristics of spontaneous infection with submaxillary gland virus of guinea pigs are described. The incidence in various local stocks of guinea pigs was found to be from 7 to 74 per cent. Inclusions were found in the renal epithelial cells of 8 per cent of adult animals examined.

2. Histological evidence is presented which suggests that the inclusion bodies associated with the guinea pig salivary gland virus are composed of elementary bodies similar to those known to occur in certain other virus diseases.

3. The relative infectivity of the virus is greater for the fetus than for the postnatal guinea pig.

4. Natural passive immunization *in utero* or *per colostrum* is inadequate to protect fetuses or suckling guinea pigs against experimental infection. In spontaneously infected adults the quality or duration of active immunity may depend upon the presence of active lesions.

5. An analogy between the distribution of the inclusion bodies sometimes found in stillborn and premature human infants and in experimentally infected guinea pig fetuses is pointed out.

KENDALL, A. I., & COLWELL, Charlotte Anne. (1938). **Observations on Inactivation and Reactivation of a Bacteriophage. Studies in Bacterial Metabolism. CX.** —*J. infect. Dis.* **63.** 81–93. 3 tables. [Numerous refs.] [Authors' summary copied *verbatim*].

' Pure ' bacteriophage is more readily inactivated by certain aldehydes than a corresponding phage engendered in broth. The phage inactivating power of these aldehydes decreases with increase in molecular size. A chlorinated aldehyde is less effective in inactivating phage than the corresponding unchlorinated aldehyde. Acetaldehyde, but not the corresponding acid, alcohol or ketone, will inactivate bacteriophage under parallel conditions. Under certain conditions, formaldehyde inactivated broth phage may be ' reactivated ' by dilution with distilled water, or with broth.

The degree of ' reactivation ' observed with broth as a diluent is greater than the ' reactivation ' observed with water as the diluent under otherwise parallel conditions.

It is suggested that inactivation of bacteriophage by minimal amounts of aldehyde is a chemical reaction. Inactivation results from a chemical union of NH_2 groups of the phage with the CHO group of the aldehyde.

PARASITES IN RELATION TO DISEASE (GENERAL)

JADIN, J., & DELPERDANGE, G. (1939). Contribution à l'étude de l'helminthiase et de la parasitologie de l'équateur. **[Human and Animal Protozoan and Helminthic Diseases in the Equatorial Zone of Africa].**—*Ann. Soc. belge Méd. trop.* **19.** 547–556. 2 tables. [7 refs.]

The authors record their findings of parasites of human beings and animals during a two-year survey in the Coquilhatville region of the Belgian Congo. One table shows organs of food animals which were condemned owing to parasitic disease. In 886 pigs, *Fasciola hepatica* accounted for condemnation of 6 livers and 4 lungs, and *Metastrongylus elongatus* for that of 16 lungs. *F. hepatica* in the liver of 1 out of 260 sheep and *F. gigantica* in the livers of 6 out of 40 cattle were other determinations. *Ancylostoma duodenale* and *Strongyloides stercoralis* were found in both pigs and human beings. Because of the cohabitation of pigs with natives, pigs may be an important reservoir of human ancylostomiasis. Other parasites found included *Gastrodiscus aegyptiacus* from a pig, *Cysticercus tenuicollis* from the liver of an ox, *Toxascaris leonina* and *Ancylostoma caninum* in native dogs, *Choerostrongylus pudendotectus* in pigs, *Haemonchus contortus* in native sheep and goats, and *Quilonia uganda* in an elephant originally from " les Uélés ". Parasites of poultry were *Raillietina tetragona*, *Syngamus trachea*, *Heterakis gallinae*, and *Ascaridia galli*.

Specific trypanosomiases of pigs, dogs, and rats (*suis*, *congolense*, *lewisi*), were determined. *Theileria parva* was found in cattle, with *Rhipicephalus capensis* and *Amblyomma variegatum* as probable vectors. *Trichomonas columbae* caused the death of complete flights of pigeons. Amoebae resembling *Dientamoeba fragilis* found in pigeons proved non-pathogenic for cats. A dysenteric species of amoeba of cattle, of the same dimensions as *Entamoeba histolytica*, is described.

The flea, *Echidnophaga gallinacea* was the indirect cause of frequent losses among poultry.

—C. V. WATKINS.

PARASITES IN RELATION TO DISEASE (ARTHROPODS)

BISHOPP, F. C. (1939). **Some Problems in Medical and Veterinary Entomology.**—*J. Parasit.* **25.** 1–9.

A presidential address before the American Society of Parasitologists. B. lays special emphasis on the value of co-operation between workers interested in different aspects of a problem, and cites some examples where such co-operation has been the main factor in the solution of a research problem. Control of the screwworm, *Cochliomyia americana*, has been much advanced since CUSHING and PATTON

(1933) discovered that it had been confused with another harmless species. Investigations on the physiology of blowfly larvae and the nature of their excretions have led to the use of allantoin and urea in the treatment of indolent wounds such as burns or the lesions of osteomyelitis.

Further emphasis is placed on the importance of research workers keeping in close touch with applied work in the field, both to achieve a practical outlook, and because much important information may be brought to light by the large scale of the work.

The importance of the human element in control work is stressed, as failure of many sound control schemes can be traced to lack of educational work among the lay public on whose interest and co-operation success finally depends.

JACK, R. W. (1939). **Studies in the Physiology and Behaviour of *Glossina morsitans*, Westw.**—*Mem. Dep. Agric., S. Rhod.* No. 1. pp. 203 + vii. 27 text-figs., 3 figs. on 3 plates, 59 tables, 1 appendix. [Numerous refs.]

These studies are based on the results of laboratory research carried out at Salisbury since 1936 on the biology and behaviour of *Glossina morsitans*, and on data on behaviour collected over many years in the field. Part I, the physiology section, deals with fatal high and low temperatures and insolation, and with the influence of atmospheric conditions on physiology, welfare, development etc. Part 2, on behaviour, comprises discussion on reactions to light, moving objects etc., activity, temperature preference, attractions for flies in the field, and the feeding ground picture. There is also a general discussion, a summary, and an appendix.

Newly emerged or recently fed adults are killed in a few minutes at 46°C., in three hours at 40°C., and in one hour at 42°C.; with hunger or reduced water content these effects may occur at 1°C. lower. Pupae are all killed at 42°C. Frost kills all flies at –5°C. in three hours. Enforced resting in sun rays kills in one hour; flies so treated face the sun.

Flies are in best condition in the wet season. Adults do not drink water or absorb it from a saturated atmosphere. Blood ingested becomes concentrated, excess of water being excreted rapidly, during and after a meal. In captivity, flies fatten more in the dark than in subdued light. When starving, life is prolonged by low temperature and high humidity. Production of water through oxidation of fat is insufficient to replace water lost through various causes, even in a saturated atmosphere. With very rapid loss of water in hot, dry weather, thirst may cause the females to seek man, their fat content being higher than in females biting man in humid weather. Expenditure of fat is to some extent accelerated by high temperature and slightly by low humidity; the same factors also affect synthesis. Females consistently take larger meals than males and accumulate more fat. Desire for blood is affected by the interval since the last meal, by exhaustion of proteins, or by thirst; approaching exhaustion of fat is not, however, essential to appetite. The optimum temperature range for breeding is 18°–30°C. The period between depositions of larvae varies from 26 days, the shortest at the lower temperature, to 7–8 days at 30°C. Inseminated females kept at 24°C., relative humidity 50%, bred regularly if fed daily or every second day, but not if fed every fifth day. Proteins obtained from ingested blood appear necessary for the retention of the ovum. At 30°C. the pupal period is 20–33 days, at 24°C., 32–34 days, and at 18°C., 68–72 days.

Reaction of flies to light is generally positive at moderate temperatures, but at high temperatures the reaction to intense light becomes strongly negative. Activity is seen by movement of limbs at 10°C., crawling commences at 13°C., and at 16°C. flies are fully active and will feed. Positive reactions to a moving object were found to occur with hungry flies but not with those recently fed, and to be independent of sound, scent, air disturbance, earth vibrations, or direction of the movement. The mean temperature choice was 24°C., but the range was large.

In the field there is as yet no evidence of attraction to man other than through the stimuli of movement and scent; it is evident that female flies are not attracted to man for normal meals. Attraction to animals seems to be brought about by movement, scent, or in seeking shade. A motor vehicle was found to attract more flies than man. It is probable that a moving lorry attracts female flies ready to feed in spite of a considerable fat content, while man only attracts more or less starving females. It is thought the only attraction of traps is the shade they provide, particularly in the dry season. Hungry flies are attracted to the better illuminated spots in the forest because hunger

increases activity and the positive reaction to light. After feeding there is normally a return to shade, chiefly for the processes of primary excretion and concentration of the ingested blood; this occupies a few hours at the most. Activity is not confined to hungry flies.

—J. A. GRIFFITHS.

WILSON, S. G. (1939). **A Note on the Fly Areas of North Nyasa District.**—*Bull. ent. Res.* **30.** 255–258. 2 maps. [3 refs.]

W. shows in this note the distribution of *Glossina brevipalpis* in northern Nyasa in 1939 as compared with that of 1911. The reduction in the number of tsetse is the result of the intensive cultivation of river banks for cotton, rice, and native food crops, the increase of the cattle to the point of over-stocking, and grass-burning. The present tsetse areas are either uninhabited or the soils are unsuitable for cotton cultivation. The clearing effect of native cultivation is intensified somewhat by the continuous nature of the cropping system (rice is grown in the wet season and cotton in the dry months). The distribution of the cattle indicates the tsetse-free areas, and the lessened density of tsetse within the fly-belt emphasizes the change in the situation. *Trypanosoma congolense* is the parasite found in infected cattle in the area.—J. A. GRIFFITHS.

SCHUHARDT, V. T. (1940). **A "Ticktorium" for the Propagation of a Colony of Infected *Ornithodoros turicata*.**—*J. Parasit.* **26.** 201–206. 4 figs. on 1 plate, 1 table. [8 refs.]

This method of housing spirochaete-infected ticks consists essentially of the use of a miniature limestone cavern, simulating their normal habitat, the entrance and floor of which are covered with limestone dust collected from the same place as the original ticks. The cavern rests on a board overlying a layer of sand, which can be kept moist. The whole structure is placed in a galvanized iron box. The ticks are fed on white rats, by placing the latter in a "hardware cloth" cylinder of ½ in. mesh in front of the cavern. Precautions designed to prevent the ticks escaping, after removal of the rats, are outlined.—M. L. BINGHAM.

KAURA, R. L., & IYER, S. G. (1937). **The Occurrence of Air-Sac Mite, *Cytoleichus nudus* (Vizioli, 1870), in Fowls in India.**—*Indian J. vet. Sci.* **7.** 299–301. 2 figs. on 1 plate. [4 refs.] [Authors' summary copied *verbatim*].

The occurrence of mites within the air-sacs of fowls is recorded, for the first time in India. Although primarily parasitic in these sites, an extensive infestation of the organs had developed.

This mite is indistinguishable from *Cytoleichus nudus* (Vizioli, 1870), popularly known as the air-sac mite.

On account of the difficulty in treating the affected fowls it is considered to be a serious condition.

PARASITES IN RELATION TO DISEASE (HELMINTHS)

ROGERS, W. P. (1940). **Haematological Studies on the Gut Contents of Certain Nematode and Trematode Parasites.**—*J. Helminth.* **18.** 53–62. 4 tables. [15 refs.]

The investigation was made to determine whether more delicate methods of estimating the presence of haemoglobin could give more definite information on the blood-sucking habits of parasitic worms.

Qualitative and quantitative spectroscopic estimations were made of the amounts of haemoglobin and its products present in the gut of the worms; microscopic examination gave little evidence as to the nature of the intestinal contents. Details of the various estimations are given. Haematin was found in the gut of *Strongylus edentatus*, *Str. vulgaris*, and in most specimens of *Toxocara canis* and *T. mystax*; only a small proportion of the specimens of *Ascaris lumbricoides* examined contained haematin in the intestine. Evidence is given indicating that the host's blood probably forms a large proportion of the diet of fourth stage *Str. vulgaris* larvae.

Syngamus trachea was found to have haematin in its intestine, but no trace of blood pigments was found in *Oxyuris equi*. The results indicate that the black pigment found in *Schistosoma bovis* (= *matthei*) and *S. mansoni* was probably haematin formed by the digestion of the host's haemoglobin.—R. ALLCROFT.

BHALERAO, G. D. (1939). **A Few Unusula Helminths of Some Domestic Animals**

in India.—*Indian J. vet. Sci.* **9.** 371–374. [9 refs.]

Data are given on three helminths identified for the first time in India :– *Mesocestoides litteratus* from the intestine of a cat at Mukteswar, a coenurus of *Multiceps gaigeri* from the mucous membrane of the eye of a goat at Broach, and *Dictyocaulus filaria* from the bronchi of a buffalo at Peshawar. Two immature female specimens of *Parafilaria*, recovered from haemorrhagic nodules of cattle in Karachi are tentatively assigned to the species *bovicola*.—D. D. OGILVIE.

MOLINTAS, D. M. (1938). **A Study of Four Systems of Managing Calves to Control Internal Parasites.**—*Philipp. Agric.* **27.** 445–467. [Numerous refs.]

Helminthiasis is said to cause appreciable losses in young calves and buffaloes in the Philippine Islands, the commonest parasite being *Ascaris vitulorum*.

Forty-eight calves 10–15 days old were separated into similar lots which were managed as follows :– Lot A were kept in corrals by day and set free with their dams at pasture by night ; lot B were managed in the converse manner ; lots C and D were left at pasture with their dams continually, the hind quarters and udders of the dams of lot D being washed once daily. Faecal worm counts were made and as soon as the calves showed evidence of parasitism they were dosed variously with oil of chenopodium, oil of turpentine, calomel, tartar emetic, resorcinol, or carbon tetrachloride.

None of the above management systems had any appreciable inhibitory effect on natural infestation, calves in all lots becoming infested at about 28 days of age. Of the drugs used, carbon tetrachloride was judged to be very effective, oil of chenopodium fairly effective and the rest ineffective. Calomel and tartar emetic were, moreover, harmful, causing haemorrhagic nephritis.

" Many " calves did not become infested at all although subjected to the same risk as the rest. One ox calf and five buffalo calves died from helminthiasis during the experiment and five more from various other causes.—J. E.

ENDRIGKEIT, A. (1939). Die Parasiten der Pferde in Ostpreussen unter besonderer Berücksichtigung der kleinen Strongyliden. **[Parasites of Horses in East Prussia with Particular Reference to the Small Strongyles].** — *Arch. wiss. prakt. Tierheilk.* **75.** 1–19. 12 figs., 1 table. [Numerous refs.]

The paper contains lists of parasites obtained at P.M. examination of 50 horses from January to March, 1938. The parasites observed included *Strongylus vulgaris, S. equinus, S. edentatus* ; *Triodontophorus serratus, T. brevicauda* ; *Craterostomum mucronatum* ; *Trichonema labiatum, T. coronatum* ; *Trichonema* (*Cylicocercus*) *pseudocatinatum, T. goldi, T. pateratum* ; *T.* (*Cyclicocyclus*) *elongatum* var. *kotlani, T. insigne, T. nassatum* var. *parvum, T. leptostomum* ; *T.* (*Cylicostephanus*) *calicatum, T. minutum, T. longibursatum, T. poculatum* ; *T.* (*Cylicodontophorus*) *bicoronatum, T. ultrajectinum, T. ilei* ; *Poteriostomum imparidentatum, P. ratzii kotlani* ; and *Cyalocephalus capitatus*.

The individual incidence of the larger strongyles was :– *S. equinus* (65 %), *S. edentatus* (50 %), and *S. vulgaris* (79 %). E. regards the high incidence of *S. equinus* as significant.

An outstanding feature was the very high incidence of *Trichonema* spp. *T. pseudocatinatum* was the commonest species with an incidence of 82 %. Next followed *T. nassatum* (76 %), and *T. minutum* (53 %). The existence of *T. leptostomum, T. pateratum, T. ilei,* and *T. ultrajectinum* in Germany was confirmed for the first time. In view of the large number of species found, it is suggested that their pathogenicity may be greater than has been hitherto believed.

Large numbers of tapeworms were found in 40 % of the horses. The commonest cestode was *Anoplocephala perfoliata*, and one example of *A. magna* was found. *Oxyuris equi*, ascarids, and filariids were not frequent.—A. L. WILSON.

CLAPHAM, Phyllis A. (1940). **Studies on *Coenurus glomeratus*.**—*J. Helminth.* **18.** 45–52. [4 refs.]

Infections with *C. glomeratus* were obtained in mice and a rabbit. The cysts produced adult *Multiceps glomeratus* when fed to dogs, but cats were resistant. The coenuri from mice were subcutaneous and simple ; some of those from the rabbit were intramuscular and simple, whilst others were intraperitoneal and proliferating and resembled those recorded from the gerbille. There was no trace of cysts until ten months after infection, but thereafter they matured rapidly. Reactions of the vectors to the presence of coenuri were studied. A positive intradermal test was obtained in the rabbit from the use of specific antigens.

—M. L. BINGHAM.

CAMPBELL, D. H. (1938). **Further Studies on the "Nonabsorbable" Protective Property in Serum from Rats Infected with *Cysticercus crassicollis*.**—*J. Immunol.* **35.** 465–476. 3 figs., 3 tables. [8 refs.]

Following the demonstration of an "early" and "late" immunity in rats against *C. fasciolaris* [*V. B.* **6.** 659.], C. has carried out further experiments to show the presence of two different antibody mechanisms in the serum of infected rats. The protective property responsible for early immunity was absorbable, but that responsible for late immunity was not absorbable; no late immunity reaction was detectable in artificially immunized animals. A comparison of untreated and specifically absorbed serum indicated that, although the prophylactic value of untreated serum is relatively much greater than its therapeutic value, absorption greatly reduces the prophylactic value, whilst leaving the therapeutic value unimpaired.—M. L. BINGHAM.

CLAPHAM, Phyllis A. (1939). **Some Polyradiate Specimens of *Taenia pisiformis* and *Dipylidium caninum*, with a Bibliography of the Abnormalities occurring among Cestodes.**—*J. Helminth.* **17.** 163–176. 2 figs. [Numerous refs.]

C. reviews the incidence and types of abnormalities occurring among cestodes. Such anomalies include irregular segmentation (frequently associated with abnormalities of the genitalia), fenestration and dichotomy, and melanism. A case of partial melanism in *T. pisiformis* is recorded in which the pigment was deposited in the vas deferens and cirrus sac in every segment. A completely different type of malformation gives rise to polyradiate forms. A number of tri-radiate and quadri-radiate specimens of *T. pisiformis* are described, and tri-radiate segments of *D. caninum* were found in one dog. In the course of a year abnormal specimens of *T. pisiformis* have been found in 8% of infected animals examined.—M. L. B.

I. HOWELL, Nancy. (1939). **Hydatid Disease in Wales.**—*Rep. med. Offr Minist. Hlth, London. 1938.* pp. 192–195. [Reprinted in *Vet. Rec.* **52.** 493–495. (1940)].

II. —. (1940). **Hydatid Disease.**—*Vet. Rec.* **52.** 495–497.

I. This summary of hydatid disease, particularly as it occurs in the industrial districts of South Wales, was compiled by the Welsh Board of Health after receiving notification of its high incidence in April 1937. Some 144 cases had been recorded by Welsh hospitals in the period 1927–1936, in persons 2½–77 years old, 80 of them having died. These figures give no indication of the degree of infestation in human beings; at P.M. examinations, cases which have presented no clinical symptoms are often found. The probable sources of the disease are discussed, but practically no attempts were made to determine them. During a short period a report of hydatid disease in food animals was compiled from the records of four abattoirs (nil in 3,222 calves; 16 out of 7,251 pigs; 780 out of 23,165 sheep, and 108 out of 1,715 cattle). Much evidence is brought forward to suggest the necessity of more stringent application of public health regulations.

II. This annotation on echinococcosis emphasizes the relative importance of the sheep among the intermediate hosts and of the dog among the final hosts of this parasite which is probably, in its larval stage, the most serious helminth parasite of man; various wild carnivores are also important as final hosts. If control is to be effective, the adult stage in dogs must receive primary attention. The reasons for strict personal hygiene before cooking and eating and for thorough washing of green foods should be made known to the general public.—C. V. WATKINS.

TENHAEFF, C., & FERWERDA, S. (1940). Experimenteele echinococcose. [**Experimental Echinococcosis**]. — *Tijdschr. Diergeneesk.* **67.** 124–131. [6 refs.] [English, French and German summaries].

Reference is made to the work of DÉVÉ [*V. B.* **8.** 294.], who attempted to transmit echinococcosis to mice, and also to that of DE WAELE and DE COOMAN [*V. B.* **9.** 860.] who tried to infect mice, rats and g. pigs experimentally. The authors injected white mice intraperitoneally with the brood capsules from cysts obtained from sheep, pigs, and horses. They obtained fewer positive results than the earlier workers, and suggest that this may be due to the fact that old cysts were used whose scolices had only slight, if any, vitality. The symptomatology and pathology of the disease in mice are described. A vitamin D preparation, administered to obtain calcification of the cysts, gave poor results.—L. TOBBACK.

I. ACKERT, J. E., & CASE, A. A. (1938). **Susceptibility of Mature Chickens to**

Tapeworm Infections.—*Trans. Kans. Acad. Sci.* **41.** 299–302. 2 tables. [6 refs.]

II. LUTTERMOSER, G. W. (1940). **Meal Beetle Larvae as Intermediate Hosts of the Poultry Tapeworm** *Raillietina cesticillus.*—*Poult. Sci.* **19.** 177–179. 1 table. [3 refs.]

I. Following their previous work on *Raillietina cesticillus* [*V. B.* **9.** 548.] the authors have attempted to ascertain whether infestations in adult fowls are acquired when the fowls are immature or mature.

Carefully controlled experiments are described, showing the life-history of the tapeworm and the susceptibility to it of adult fowls. Tapeworm eggs, contained in gravid proglottids collected from the faeces of infested fowls, developed into cysticercoids in the body of an experimentally infected beetle in from 15–20 days. These cysticercoids, before evagination, were fed to four mature fowls, about seven months old, each fowl being given 100 cysticercoids. The fowls were found to be infested with adult tapeworms after 12–85 days. The authors conclude that fowls may become infested with this species, even as adults.

II. This paper is a confirmation of findings previously recorded [see *V. B.* **8.** 584.], and in addition it is shown that the larvae and pupae of the meal beetle, *Tribolium* spp., are potential carriers of this widespread poultry tapeworm.

Gravid segments of three species of poultry tapeworms, *viz*, *Hymenolepis carioca*, *R. echinobothrida*, and *R. cesticillus*, were fed to larvae and adults of these beetles, and the developed cystercoids were subsequently fed to chicks under controlled laboratory conditions. Only the adult beetles became infested with the cysticercoids of the tapeworm *Hymenolepis carioca*. Cysticercoids of *R. cesticillus* developed in both larval and adult beetles, but neither were susceptible to infestation with *R. echinobothrida*.

The beetle larvae ingested the worm segment material readily when offered to them, even in the presence of large amounts of other food, such as bran.—S. G. IYER.

SHORB, D. A. (1940). **A Comparative Study of the Eggs of Various Species of Nematodes Parasitic in Domestic Ruminants.**—*J. Parasit.* **26.** 223–231. 4 figs. [5 refs.]

S. has measured a number of eggs of each species of the nematode genera occurring in domestic ruminants in the U.S.A., and has prepared charts showing considerable average differences in egg size in many cases, which make identification reasonably sure. In a few cases, overlapping of size makes identification by this method difficult or impossible. Details of egg morphology, and of host and geographical distribution of the parasites are also given to assist in identification in such cases. These charts should be very helpful where different species, of varying degrees of pathogenicity, occur in the same host.—K. M. S.

SCHEIFLEY, C. H. (1938). **The Prevalence of Trichinosis.**—*Amer. J. Hyg.* **27.** 142–148. 1 fig., 2 tables. [15 refs.] [Author's summary copied *verbatim*].

From 2,597 cadaver examinations summarized from the literature since 1901 an incidence of trichinae infestation of 12·3 per cent is derived.

A survey of 118 cadavers from Minneapolis and St. Paul Charity hospitals is reported, of which 12·7 per cent were found to be trichinous. This is combined with a previous report on 117 dissecting room cadavers from Minneapolis giving 235 cases with an incidence of 14·4 per cent.

Evidence is presented which indicates that the incidence of trichinosis among the adults of the United States is in the neighborhood of 20 per cent.

BARRETT, C. D., & SEARS, R. (1938). **The Epidemiology of Trichinosis.**—*Amer. J. publ. Hlth.* **28.** 706–717. 1 fig., 12 tables. [13 refs.] [Authors' summary copied *verbatim*].

The problem of trichinosis has been reopened by data recently assembled. It requires further study. Trichinosis may be a public health problem of considerable magnitude. It cannot be dismissed as a " rare disease ".

HOBMAIER, M., & GEIGER, J. C. (1938). **Trichinelliasis in San Francisco.**—*Amer. J. publ. Hlth.* 28. 1203–1211. 2 tables. [7 refs.] [Authors' summary copied *verbatim*].

The relative protection intended by the Meat Inspection law against trichinelliasis in man has to be made more effective and, in addition, the spread of trichinelliasis to pigs prevented by the following means :

1. *Sanitation in management of hog ranches* : a. Licensing garbage feeding under the provisions of rendering garbage safe by technical

methods. b. Extermination of rats (ratproof buildings, poisoning). c. Freeing of hog ranches from cats and dogs.

2. *Trade regulations*: a. Exclusion of pork food products of Group 4 from the Market. b. Breakfast sausages should be manufactured from safe pork. c. Limited trichinella inspection for manufactured pork food products is desirable. d. Safe products should carry declaration: Guaranteed Safe, Meat Inspection of Department of Public Health. e. Labels: " Prepared from . . . inspected meat " are not advisable on products of Group 2. f. Clearly visible inscription on sales of pork: Cook Pork Thoroughly.

3. *Education of consumer*: a. In regard to occurrence of trichinellae in food and dangers of raw or undercooked pork and pork food products. b. How to avoid undercooking.

4. *Instructions to personnel of eating places—similar to those for consumers.* Mechanical safety devices. Hamburgers are to be made from beef only.

SCHWARTZ, B., & PORTER, D. A. (1938). **The Localization of Swine Lungworm Larvae in the Earthworm, Helodrilus foetidus.**—*Livro Jubilar Prof. L. Travassos.* pp. 429–440. 5 figs., 1 table. [5 refs.] Rio de Janeiro: Instituto Oswaldo Cruz. [In English].

Larvae of swine lungworms (*Metastrongylus elongatus* and/or *Choerostrongylus pudendotectus*) were found in each of 63 specimens of *H. foetidus* examined. The number per specimen ranged from 1 to about 350, and tended to be greater in worms from land where pigs were kept.

It was established that the whole development of the larvae in the earthworm takes place in the blood, nearly 94% being localized in the blood sinuses of the calciferous glands.—E. S.

SPINDLER, L. A. (1940). **Effects of Tropical Sunlight on Eggs of *Ascaris suis* (Nematoda), the Large Intestinal Roundworm of Swine.**—*J. Parasit.* **26.** 323–331. 2 tables. [11 refs.] [Author's summary copied *verbatim*].

Fourteen tests designed to ascertain the effect of tropical sunlight (apart from its heat) on eggs of the swine ascarid were carried out under conditions existing in Puerto Rico. In 9 tests eggs in shallow water were exposed to sunlight; in five other tests eggs were first dried in glass dishes and then exposed.

Undeveloped eggs both in water and dried were less resistant to the effects of sunlight than fully developed eggs. All the one-celled eggs in water failed to survive continuous exposure to sunlight as long as 3 hours, and none survived 2¾ hours exposure in a dried condition; some embryonated eggs in water survived 5 hours, and some as long as 9 hours. Embryonated eggs exposed in a dried condition failed to survive exposure periods as long as 5 hours.

SEURAT, G. (1939). Contribution à l'étude des pseudotumeurs vermineuses des animaux. Le spiroptère ensanglanté du chien. **[Contribution to the Study of *Spirocerca sanguinolenta* in the Dog].**—*Thesis méd., Algiers.* pp. 81. 11 figs. [Numerous refs.]

A general paper describing the morphology, life-cycle, pathology, and importance of *Spirocerca* infestation. S. found that the larvae always penetrated an organ from the outer surface and not from the lumen. The aorta was the predilection site, the oesophagus also bearing numerous " pseudo-tumours ".—A. L. W.

SRIVASTAVA, H. D. (1939). **Cutaneous Microfilariasis in Indian Cattle (Preliminary Report).**—*Indian J. vet. Sci.* **9.** 389–391. [2 refs.]

A case of cutaneous microfilariasis in a six-year old bullock is described. The animal was practically denuded of hair, and had scars and open sores over the whole body. Skin sections contained numerous unsheathed microfilariae, 0·25–0·28 mm. × 0·004 mm. in size. The blood was negative on examination. The disease was most acute in the summer, and tended to disappear temporarily in the winter. The condition is compared and contrasted with those produced in Indian cattle by *Parafilaria multipapillosa* (" blood boils ") and in Japanese cattle by a microfilaria which is so far unidentified.—D. D. OGILVIE.

MOORTHY, V. N., & SWEET, W. C. (1938). **Further Notes on the Experimental Infection of Dogs with Dracontiasis.**—*Amer. J. Hyg.* **27.** 301–310. 3 figs. on 3 plates. [6 refs.] [Authors' summary copied *verbatim*].

Reports are made on autopsies of three dogs (nos. 14, 15, and 23) that had been given infective *Dracunculus* larvae by mouth, and of one dog (no. 31) into which infective larvae had been injected intravenously. Autopsy findings in animal no. 13, which served as a control for

the animals infected by mouth, and in the animal no. 32 which served as a control for the animal infected intravenously are also given.

In the discussion, points are raised with regard to age immunity to guinea-worm infection in dogs, the resistance to superinfection in human beings, the sex factor in infection, the situation in the body in which the worms were found in experimental dogs, the possible migration of worms through the circulatory or the lymphatic system, the possible fertilization of females in the deeper tissues of the body, the fate of male worms, and the possible causation of meningitis and epileptiform seizures by migrating immature worms in the brain and meninges. The general procedure that was adopted in infecting dogs with dracontiasis is also given.

SUMMERS, W. A. (1940). **Fleas as Acceptable Intermediate Hosts of the Dog Heartworm, *Dirofilaria immitis*.**—*Proc. Soc. exp. Biol., N.Y.* **43.** 448–450. [4 refs.]

Microfilariae were observed in the fleas *Ctenocephalus canis*, *C. felis*, and *Pulex irritans* taken from dogs infested with *D. immitis*. The female fleas were more frequently and more heavily infested than the males, and from some If the infested dogs 100% of the female fleas examined contained one or more infective larvae and many in other stages of development. on male fleas these stages were seen only in small numbers and infective larvae were never observed.

The three species of fleas were experimentally infested with the extra-mammalian stages of the parasite and the development was studied. The minimum time required for development from the microfilarial to the infective stage was 120 hr. in fleas compared with 240 hr. in mosquitoes infested in the same laboratory.

Development began in the haemocoele of the flea and not in the Malpighian tubules and it was observed that development occurred more rapidly in summer (120 hr.) than in winter (216 hr.).—A. L. WILSON.

IMMUNITY

PANISSET, L., & DAUVOIS, L. (1939). Contribution à l'étude de la résistance non spécifique dans les maladies à ultravirus. La vaccination contre la fièvre charbonneuse et la résistance non spécifique acquise contre la fièvre aphteuse. **[Non-Specific Resistance in Ultravirus Diseases. Vaccination against Anthrax and Acquired Non-Specific Resistance to Foot and Mouth Disease].**—*Bull. Acad. vét. Fr.* **12.** 265–270. [3 refs.]

The authors review the subject of specificity as applied to infections, vaccines, sera, and humoral reactions, and draw attention to many facts which have tended to upset conceptions based on this principle since Pasteur's day. Numerous observers have noted a non-specific immunity to F. & M. disease in cattle recently vaccinated against anthrax. The recent severe epizootic of F. & M. disease throughout France furnished an opportunity to check this assumption in La Beauce, where anthrax necessitates control by means of regular vaccination.

Various preceding treatments of cattle in different herds in the area, particularly anthrax vaccination and premunization with BCG and *Brucella abortus*, are referred to, and no evidence could be found that any of them influenced the appearance or course of the F. & M. disease; no evidence of increased "paraimmunity" was found in herds immunized against anthrax during the previous eight months, as compared with those treated several years previously. In sheep all outbreaks were benign, and affected equally flocks vaccinated against other infections and those not so vaccinated.

In the discussion LEMETAYER drew attention to the presence of naturally acquired antibodies in "normal sera", which probably explains many of the observations made that were considered to indicate the possession of non-specific immunity.—C. V. WATKINS.

I. STENIUS, R. (1940). Diagnostiserandet av infektionstypen hos nötkreatur medelst tuberkulinundersökning. **[Diagnosis of the Type of Tuberculosis in Cattle by Tuberculin Testing].**—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 155–175. 6 tables. Discussion pp. 175–180. [English summary].

II. NIELSEN, F. W., & PLUM, N. (1940). **Tuberculin Reactions in Cattle due to Infection with the Human Type of the Tubercle Bacillus.**—*Skand. VetTidskr.*

30. 245–274. 3 tables. [12 refs.] [In English].

I. S. reports the results of tests on herds of cattle with bovine, human, and avian types of tuberculin. With herds known to be affected with bovine type TB., reactions with bovine and with human tuberculins were almost equal, so these tuberculins were only of value in the diagnosis of mammalian TB. collectively. In herds where bovine type TB. was unknown, but where tuberculous persons worked, some positive reactions were obtained with bovine and human tuberculins, but here again they gave no clear distinction which would enable the type of infection to be diagnosed. Reactions were more often larger with the bovine tuberculin. In herds containing animals infected with TB. of unknown type, it was not possible by a single comparative test to diagnose the type present. In four herds in which bovine type TB. was unknown, but where there was TB. in fowls on the farms, comparative tests on the cattle with human-bovine (mixture) and avian tuberculins resulted in greater reactions to the latter, so that avian type TB. could be diagnosed with some assurance.

It is stated that the standard tuberculin used on cattle in Finland is a mixture of human and bovine tuberculin (1 : 2).

S. concludes by describing his method of differentiating between the mammalian types of TB. in cattle by serial testing with bovine and human tuberculins [see also *V. B.* **10.** 160].

In a discussion NIELSEN and CHRISTIANSEN described the Danish method of diagnosing the type of infection by tuberculin : this is more rapid than Stenius' method and more suited to Danish conditions.

II. After an introduction to the subject of human type TB. in cattle, the authors describe in detail their investigation in two large herds which had given unusual reactions to repeated tuberculin tests. Eventually it was found that the reactions were due to human type infection, though in one case the person involved could not be identified. [The original should be seen for an appreciation of the complicated facts of the case.] During tests on one herd purified protein derivative was used comparatively along with the standard Old Tuberculin, but it did not give any clearer reactions than the latter.

The serious difficulty in TB. eradication introduced by the occurrence of human type infection in cattle is discussed. Even when such a case is detected there may be difficulty in effecting the removal of the tuberculous person.

There is also the question of the possibility that cows with human type TB. may excrete the infection in their milk. So far all Scandinavian workers on this problem have had negative results, all of a few hundreds of milk samples examined being found free from infection.—J. E.

WOODRUFF, C. E., & WILLIS, H. S. (1939). **Allergy and Desensitization in Experimental Tuberculosis. The Effect of Time and Dosage.**—*J. Immunol.* **37.** 549–561. 1 fig., 4 tables. [16 refs.]

G. pigs of each of two series were inoculated subcutaneously with 0·5 mg. of a virulent strain of human tubercle bacilli. One series was divided into three groups, completely desensitized, partially desensitized, and controls. Desensitization was effected by daily subcutaneous injections of tuberculin, treatment being commenced on the day that the animals were infected. The other was divided into four groups and was inoculated with smaller doses of tuberculin than was used for the first series, one group being inoculated before infection. In the first series all the completely desensitized group died with characteristic pulmonary lesions containing numerous acid-fast bacilli, but little or no evidence of tubercle formation in the liver or spleen, while in the partially desensitized group only one animal showed extensive tuberculous pneumonia ; the others became infected, but less seriously. In the second series varying results were obtained, it being noted, however, that treatment preceding infection retarded the development of skin sensitivity. The authors indicate that the coexistence of allergy and immunity may be more than casual, and that there may exist a partial reciprocal relationship between the allergic state of infected g. pigs and the number of tubercle bacilli demonstrable in their lungs. —J. R. LAWSON.

SÁ VIANA CONTE, H. E. (1938). Preparação de algumas tuberculinas e comparação dos seus valores alérgicos. **[Preparation of some Tuberculins and Comparison of their Allergic Values].**—*Repos. Lab. Pat. vet., Lisboa.* **3.** 155–182. 6 figs. on 3 plates, 14 tables. [English and French summaries].

The author tested (1) Finzi's exotuberculin prepared from both the human and bovine types

of bacilli, these tuberculins being designated A; (2) a tuberculin grown in Sauton's medium designated S, and (3) tuberculins prepared in glycerin veal broth, these being designated C.

He analysed the media before and after growth of the culture. In Sauton's medium the bovine type utilized more nitrogen and glycerin than the human type. In the glycerin veal broth medium the bovine type utilized less nitrogen but more glycerin than the human type.

The tuberculins were compared with the standard Frankfort tuberculin designated P. By the intradermal test on infected g. pigs, the author found A superior to S and both these superior to C and P. In healthy g. pigs A produced a slight thickening of the skin, while S, C, and P caused no noticeable reaction. In subcutaneous tests for toxicity in both infected and healthy g. pigs, the author found that for infected animals the toxicity decreased from S—>P—>C—>A, while for healthy animals they all proved non-toxic.—MILLER WATSON.

TROPA, E. A., & JACOB, M. M. (1938). Ensaios duma brucelina tipo Mirri no diagnóstico da brucelose caprina. **[Use of Mirri's Brucellin in the Diagnosis of Brucellosis in Goats].**—*Repos. Lab. Pat. vet., Lisboa.* **4.** 155–161. 2 figs. [7 refs.] [English and French summaries].

The authors prepared a brucellin of the Mirri type, and used it for intradermal tests on the eyelid, simultaneous agglutination tests being carried out. The brucellin was inferior to the agglutination test in diagnostic value. —MILLER WATSON.

WINTER, A. R., & NADAL, R. (1940). **The Influence of Salmonella Species on the Whole Blood Pullorum Test.**—*Poult. Sci.* **19.** 143–146. 1 table. [14 refs.]

The authors describe experiments carried out to ascertain whether infection with various salmonella organisms would affect the reliability of the whole-blood pullorum test. For the immunity experiments, negatively-reacting one-day-old chicks and eight-week-old chickens were used. The pathogenicity of each species or strain of *Salmonella* was tested on five one-day-old chicks, and six eight-week-old birds. All bacterins were standardized to 25×10^8 bacteria per c.c.

The following species of *Salmonella* were used for vaccination or infection :– *gallinarum, typhi-murium, enteritidis, paratyphi, paratyphi B, cholerae-suis* and *anatum*. It was found that, when inoculated intraperitoneally, all the organisms used were highly pathogenic for the chicks but only a few of them produced ill effects on the older birds.

The following results were obtained :–(1) vaccination with fowl typhoid vaccine interfered with the whole-blood pullorum test for at least two weeks after a single vaccination; (2) birds infected with *S. gallinarum, S. typhi-murium, S. enteritidis, S. paratyphi,* and *S. paratyphi B,* reacted typically to the whole-blood pullorum test seven days after inoculation, and (3) *S. cholerae-suis* and *S. anatum* had no effect on the whole-blood pullorum test.

It would appear from these results that cross-agglutination between *S. pullorum* and related *Salmonella* may occur, even though several of these do not belong to the same antigenic group.—G. C. BRANDER.

RAMON, G., & LEMÉTAYER, E. (1939). Valeur et durée de l'immunité chez le cheval vacciné contre le tétanos au moyen de l'anatoxine tetanique. Conséquences. **[Value and Duration of Immunity in Horses Vaccinated against Tetanus with Anatoxin].**—*Bull. Acad. vét. Fr.* **12.** 418–421. 2 tables. [12 refs.]

Vaccination of horses against tetanus, with 2 doses of anatoxin, plus tapioca powder as an adjuvant, inoculated with a month's interval between each dose, produced a solid and highly stable immunity in 145 horses; their blood serum developed an antitoxin content sufficiently high to afford complete protection against lethal doses of toxin. The duration of the immunity produced may last from 8–10 years.

The use of the anatoxin allows also the rapid production of a hyperimmune serum. Under the old method of hyperimmunizing with toxin, more or less attenuated, a large number of injections (40–50) over an extended period of time (4–6 months) was necessary before a serum of even low potency could be produced. By using anatoxin plus tapioca, however, a much more potent serum can be produced in a shorter time. Examples are given of cases where after seven injections, in one month, serum giving from 4,000–12,000 international units of antitoxin was obtained. Apart from the advantages derived from the more rapid production of serum, it is pointed out that the incidence of serum shock is greatly reduced, because of the smaller doses required for curative purposes.—J. R. LAWSON.

BURNET, F. M. (1938). **The Specificity of Active Immunity in Mice Against Influenza Virus.**—*Brit. J. exp. Path.* **19.** 388–392. 2 figs., 2 tables. [4 refs.] [Author's summary copied *verbatim*].

1. A relatively specific immunity can be induced in mice by the intranasal inoculation of " Melbourne " egg-adapted influenza virus. Protection against the strains " Melbourne " and " Philadelphia " is complete, " P.R.8 " occupies an intermediate position, and very little resistance against " W.S." and " Leningrad " is induced.

2. Mice can be immunized effectively against a virulent (" W.S.") strain by intranasal administration of living virus in unanaesthetized mice.

3. Immunity induced by either intranasal or intraperitoneal inoculation of " W.S." is relatively generalized.

ANDREWES, C. H. (1939). **Immunity in Influenza: The Bearing of Recent Research Work.**—*Proc. R. Soc. Med.* **32.** 145–152. [15 refs.]

The name " influenza " in human medicine covers a variety of conditions which cannot be classified with certainty on clinical grounds. An examination of throat garglings shows that during widespread epidemics it is usually easy to obtain a ferret pathogenic virus, whereas minor outbreaks are apparently of a different nature. A. suggests that the former should be termed " epidemic influenza " and the latter " febrile catarrh ".

It is also possible that epidemics may be caused by serologically distinct races of influenza virus. If the ferret were the only experimental animal known to be susceptible, it would be extremely difficult to detect any variations: fortunately, quantitative titrations of sera in mice permit some degree of classification. Nevertheless, influenza viruses cannot be grouped into sharp types like the pneumococci, but by selecting four strains which were relatively specific and testing others against them, an indication was obtained that there were four separate antigens occurring in different proportions. A few strains were very specific and contained a preponderance of one antigen, while others (master strains) were much broader.

The importance of strains of virus when elaborating methods of immunization is discussed, with special reference to the possible relation of swine influenza to the human disease. Regarding active immunization, it is pointed out that in the ferret the immunity resulting from vaccination with formolized virus is not of long duration nor of a high grade. In man, outbreaks of natural epidemics are very irregular and difficult to predict; in consequence vaccination must be applied well in advance of the expected onset of the disease.

In order to obtain some guidance as to the effect of vaccination, the rise in serum antibodies has been evaluated. It is admitted that it has not yet been decided whether increases in human antibodies necessarily parallel resistance to infection, but available evidence points in this direction.—R. E. GLOVER.

MCILWAIN, H. (1938). **The Effect of Agar on the Production of Staphylococcal *a*-Haemolysin.**—*Brit. J. exp. Path.* **19.** 411–417. 1 fig. [19 refs.] [Author's summary copied *verbatim*].

The production of staphylococcal *a*-haemolysin in a chemically defined medium was reduced by the calcium of agar and increased by the remainder of the agar molecule.

In all media examined the haemolysin stimulating properties of agar were not due to its sulphuric ester grouping but to the polysaccharide residue, methods of preparation of which are described. These properties were lost with loss of gelling power and not possessed by other materials examined.

Agar may act by adsorbing metabolic products deleterious to haemolysin production though not to growth.

SCHWARTZ, J. C. E. (1937). Contribution à l'étude de la toxine staphylococcique. **[Contribution to the Study of Staphylococcic Toxin].** pp. 134. 3 figs., 20 tables. [Numerous refs.] Paris : Louis Arnette. [8vo].

S. has studied a series of some 30 strains of staphylococci particularly from the viewpoint of the preparation and properties of their toxin. He describes his results and discusses the work of others on the subject. The more important of his conclusions are summarized below.

A small number of staphylococci are actively toxigenic. Neither pigmentation nor origin is an indication of toxin-producing capacity. Staphylococci isolated from " spontaneous infections " in human beings show little toxicity *in vitro*. The toxin production of most strains is favoured by cultivation in the presence

of added CO_2. With liquid media the best results were obtained in a mixture of equal parts of veal decoction prepared in the refrigerator and a digest of pig's stomach, the digestion being preferably stopped at two hours. Toxin formation was best at pH 6·8 and was not favoured by addition of glucose or buffer salts. It was not improved by repeated cultivation in the same broth or by cultivation in a cellophane bag immersed in broth.

The haemolytic activity is greatest for rabbit cells and it can be titrated against rabbit cells. Its activity towards the cells of other animals is too irregular to be explained by different sensitivity of different cells. [The work of Bigger *et al.* (1927), Glenny and Stevens [*V. B.* **6.** 484.], and others is mentioned but not discussed, in relation to the author's own findings. Fixation by the cells is inconstant and can occur without lysis following. The necrotic activity of the toxic filtrates by intradermal injection of the rabbit is the truest reflection of its pathogenic properties. Intravenous injection in the rabbit is fatal, the only characteristic action of the toxin being shown by doses which kill within ½–1 hour. The mode of action of the toxin suggests anaphylaxis. Its convulsive action and action on the cardiac and respiratory centres emphasize its neurotropism. Destruction is clear cut and constant at 55°C. for 1 hour. Ageing reduces toxicity before antigenic power. Titration with antitoxic serum should therefore be made with fresh toxin. Oil, oleic acid, and soaps have a similar effect to heat.

The author's view on the unity or plurality of the various toxins which have been described is expressed in the statement that " several antigenic substances, of an accessory nature, accompany the true toxin ".—A. W. S.

Nélis, P. (1940). L'hypothèse d'une immunité meningée " locale ", peut-elle être défendue ? [**Possibility of a " Local " Meningeal Immunity**].—*Rev. Immunol.* **6.** 159–182. 12 tables, 3 graphs. [Numerous refs.]

N. first reviews the literature for and against the local production of antibodies in the cerebro-spinal fluid. Eight experiments are described in which a total of 35 rabbits were injected suboccipitally with various antigens—BCG suspension, anastaphylotoxin (alone or in a fatty mixture), *Trypanosoma brucei* suspension, killed paratyphoid or *Brucella abortus* bacilli. In an investigation of the comparative antibody titres of the C.S.F. and the serum of these rabbits, it was found that antibodies did not appear in the C.S.F. without previously appearing in the blood, and that the antibody titre of the C.S.F. was always proportionately less than that of the blood. As long as the meninges remained intact, only a very slight proportion of the blood antibodies were shown to pass into the C.S.F. The permeability of the meninges to blood antibodies was increased by the injection of any antigen into the meningeal cavity producing local irritation and leucocytosis of the C.S.F. Such an antigen was absorbed into the general circulation and invoked the production of abundant blood antibodies which gained the C.S.F. through the now more permeable meninges. There was no evidence of antibody formation from meningeal elements.—R. O. Muir.

I. Traub, E. (1936). **Persistence of Lymphocytic Choriomeningitis Virus in Immune Animals and Its Relation to Immunity.**—*J. exp. Med.* **63.** 847–861. 1 plate, 5 tables. [1 ref.] [Author's summary copied *verbatim*].

II. Traub, E. (1938). **Factors Influencing the Persistence of Choriomeningitis Virus in the Blood of Mice After Clinical Recovery.**—*Ibid.* **68.** 229–250. 2 text-figs., 8 tables. [12 refs.] [Author's summary copied *verbatim*].

I. In some apparently healthy mice the virus of lymphocytic choriomeningitis persisted for a considerable period of time after recovery, in the blood, urine, and nasal secretions, while in other mice it soon became undemonstrable. It is possible that the persistence of the virus is due to lesions in the lungs, liver and kidneys.

The immunity of lymphocytic choriomeningitis in mice does not seem to depend upon the presence of virus in the blood and the organs tested. No antivirus was detected in sera from several solidly immune mice, which fact suggests that circulating antivirus plays no important part in their immunity. Leucocytes also seem to be no essential factor in this immunity, which probably is closely linked with the tissues.

The urine of guinea pigs which had recovered from severe attacks of lymphocytic choriomeningitis contained virus for a few weeks after recovery, while that from mild cases contained no virus. Virus was never demonstrated in the blood of immune guinea pigs. Antivirus was readily detected in it.

II. Mice infected *in utero* continued to carry choriomeningitis virus in the blood more regularly and in greater amount than suckling mice infected by contact. This result may be due to the difference in tissue maturity at the time of infection: the more immature the tissues are when infected, the longer the virus appears to persist in them after maturation. A similar result was obtained with mice of different ages infected either by contact or by intranasal instillation of virus, in that the carrier state lasted longer in the younger animals. This cannot be attributed entirely to the difference in age, however, since young mice as a rule showed more severe symptoms than mature animals. It is possible, therefore, that the difference in the severity of the disease accounted in part for that in the duration of the infection.

In mature mice infected experimentally as well as in some of the suckling mice infected by contact the severity of the disease was the determining factor, the infection persisting longest in those animals that showed the most severe reaction.

The character of the virus used also appeared to influence the persistence of the virus in the blood. A strain of virus isolated in 1935 from an infected stock mouse and modified by intracerebral passage in mice disappeared from the circulation more rapidly than the stock strain maintained by natural passage in the infected mouse stock. The guinea pig passage strain, however, which was obtained from the same mouse as the mouse passage virus but passed through guinea pigs by pad inoculation, persisted in the blood more frequently than the stock strain.

Carrier mice without exception had a high degree of immunity to intracerebral injection with virus, while other animals once infected but no longer carrying detectable amounts of virus in the blood often showed an incomplete immunity that manifested itself in an accelerated, non-fatal, reaction, presumably of an allergic nature. This observation does not prove, however, that the immunity always is an " infection immunity ", since a high degree of resistance not associated with detectable amounts of virus in the blood and brain was produced by repeated injections with the mouse passage strain.

Since the blood and the tissues of old carriers often contain large amounts of virus, it is very unlikely that their immunity is due to protective antibodies circulating in the blood or fixed in the tissue spaces. It rather appears that the susceptible cells of such animals are infected and that cells occupied by actively multiplying virus cannot be reinfected. The mechanism of this infection immunity as well as the immunity apparently not associated with infection requires further study.

GORER, P. A., & SCHÜTZE, H. (1938). **Genetical Studies on Immunity in Mice. II. Correlation between Antibody Formation and Resistance.**—*J. Hyg., Camb.* **38.** 647–662. 10 tables. [16 refs.] [Authors' summary copied *verbatim*].

1. Four mouse lines have been tested for " H " and " O " antibody production following inoculation with *Salmonella typhi murium* and *S. enteritidis*; two of these lines had been selected for resistance and susceptibility but not inbred; two, D and E, had been brother-sister inbred for over thirty generations but not selectively as far as resistance is concerned.

2. After immunization with *S. typhi murium*:

(*a*) Female mice, in all four lines, tend to give higher " H " and " O " titres than do males, a positive correlation between ability to produce antibody and resistance to infection being thus established.

(*b*) Interline differences exist for both these antibodies. Those concerned with " H " antibody may be correlated with resistance. In the case of " O " antibody, no correlation is suggested.

3. After immunization with *S. enteritidis*:

There appears to be no correlation sexually or interlineally between resistance and antibody production. That genetic differences exist, in respect of this organism also, is shown by the fact that the pure lines, D and E, give a better antibody response than the selected lines A and B. When tested for immunizability by subsequent infection with *S. enteritidis* no useful information could be obtained with strain A or B owing to their great internal variation. Strains D and E both showed a gain in expectation of life following immunization. The more resistant strain D showed a significantly greater gain than did E, the strain with a lower natural resistance.

4. The titres of normal " O " *enteritidis*-antibody found in the four lines indicates that there may be a negative correlation between the titre of these antibodies and resistance to infection with *S. enteritidis*.

5. The significance of the above findings is discussed and it is stressed that a significant correlation between resistance and antibody formation does not imply that the two phenomena are causally related.

6. It is pointed out that strains that have been inbred even without selection react far more homogeneously in the infection experiments here described than do strains that have been selected but not intensively inbred.

VAN DER SCHEER, J., WYCKOFF, R. W. G., & CLARKE, F. H. (1940). **The Electrophoretic Analysis of Several Hyperimmune Horse Sera.**—*J. Immunol.* **39.** 65–71. 18 figs. on 2 plates, 1 table. [7 refs.]

Electrophoretic studies of antisera show that, following hyperimmunization, an antibody is sometimes produced having the same electrical mobility as "γ-globulin" found in normal sera, while in other instances a new component, termed T, appears with a velocity between those of the β- and γ-globulins. Figures are given showing the relative proportion of these three components in 15 antibacterial sera, including *Clostridium welchii, Cl. sordellii, Cl. oedematiens, Cl. histolyticum, Cl. septique*, and *Erysipelothrix rhusiopathiae*.—R. E. GLOVER.

DISEASES, GENERAL

BEATON, W. G. (1939). **Goat Husbandry in Northern Nigeria including a Descriptive Survey of the Causes of Mortality.**—*Rep. vet. Dep. Nigeria, 1937.* pp. 31–48. [10 refs.] [For abstract of the report, see *V. B.* **10.** 568].

In this useful survey of goat husbandry B. gives the following list of diseases of goats in Northern Nigeria:–(1) BACTERIAL DISEASES.—Caseous lymphadenitis, infectious pneumonia, foot-rot, tetanus and anthrax. (2) VIRUS DISEASES.—Caprine contagious pleuro-pneumonia, goat pox, contagious pustular stomatitis, rinderpest and contagious agalactia. (3) PARASITIC DISEASES.—Helminthiasis, myiasis, acariasis, fungoid diseases, protozoan infections and external parasitism.

No cases of natural tuberculosis in goats have been recorded, and *Brucella melitensis* infection has not been diagnosed so far. Pox when present in a virulent form may cause 50% mortality of the infected goats and in all outbreaks there is a heavy mortality among kids and young goats. There is also loss from abortion and emaciation. Rinderpest as a lethal factor is of little importance in goat husbandry, but the goat has been an invaluable means of maintaining and transporting rinderpest virus for sero-virus inoculation of cattle. An infectious pneumonia of goats described is due to a pasteurella type of organism. Epizootics of anthrax are said to cause losses among goats, but this has not been reliably confirmed. Sporadic cases have been diagnosed and vaccination on an extensive scale has been carried out in the enzootic areas. Of the helminths, *Oesophagostumum columbianum* causes the heaviest mortality. *Moniezia expansa* may cause death from mechanical obstruction. *Haemonchus contortus* and *Ostertagia circumcincta* are also causes of heavy losses. *Monodontus trigonocephalum* is another cause of loss. *Fasciola hepatica* only causes damage in the swampy areas. Death from *Oestrus ovis* infestation is rare. The tumbu fly, *Cordylobia anthropophaga*, is said to be a fairly common parasite in the goat. Of the skin diseases, demodectic mange has great economic importance owing to the damage caused to the skins. Streptothricosis, ringworm and ticks also cause damage to the skins. A biting louse, *Trichodectes climax*, and the sucking louse, *Linognathus stenopsis*, have been identified.

—J. A. GRIFFITHS.

PERRUCCI, P. (1938). La profiliassi delle epizoozie durante le campagne. [**Prophylaxis of Animal Diseases in Wartime**].—*Rep. 13th int. vet. Congr. 1938.* **2.** 1214–1225. [In Italian: English, French and German summaries. Discussion pp. 1233–1237 in English and French].

P. refers to the difficulties in the control of epizootics in wartime, and describes the measures taken in this direction before and during the war of 1914–18 and the Abyssinian war, especially in respect of glanders, sarcoptic mange, foot and mouth disease, rinderpest, African horse sickness, and camel trypanosomiasis.—E. MARTIN.

I. MOHLER, J. R. (1939). **The Administration of Poultry Disease Control Measures in the United States.**—*Proc.*

7th World's Poult. Congr., 1939. pp. 22–26. Washington, D.C.: U.S. Dep. Agric. [In English].

II. STAFSETH, H. J. (1939). **The Poultry Disease Situation [in the U.S.A.].**—*Ibid.* pp. 215–216.

III. BEACH, J. R. (1939). **Importance of Nonspecific Pathological Conditions in Causing Mortality and Culls in Laying Flocks.**—*Ibid.* pp. 219–224. 4 tables. [4 refs.]

IV. TE HENNEPE, B. J. C. (1939). **Combating Poultry Diseases in the Netherlands.**—*Ibid.* pp. 224–227. 4 tables.

V. BISANTI, C. (1939). **Infectious Diseases of Fowls in Italy.**—*Ibid.* pp. 227–228. 1 table.

VI. EL-DINE, H. S. (1939). **Important Diseases of Poultry in Egypt and their Control.**—*Ibid.* pp. 229–231. 2 figs.

VII. HILBERT, K. F. (1939). **Disease Problems of Long Island Duck Raisers.**—*Ibid.* pp. 231–233. [5 refs.]

I. The Bureau of Animal Industry, as the veterinary unit of the United States Department of Agriculture, is responsible for the various activities in the control of poultry diseases. There are also other branches of the Department of Agriculture such as the Bureau of Agricultural Economics, Bureau of Entomology and the Food and Drug Administration whose activities relate directly or indirectly to the safeguarding of the health of poultry. M. stresses the necessity for perfect co-operation between all parties and departments if good results are to be obtained.

The United States Department of Agriculture and the State agricultural colleges and experiment stations conduct extensive research on matters relating to poultry disease control, in close co-operation with other agencies such as the State livestock and poultry officials, and farmers' organizations, and with others interested in the successful development of poultry raising.

Work on the production of disease-resistant poultry is in progress at the newly established Regional Poultry Research Laboratory at East Lansing, Michigan; genetic problems relating to fowl paralysis are also being investigated. A list is given of the commonly occurring diseases of poultry, together with ecto- and endoparasites, on which research work is being, or will be, concentrated.

An account is given of the measures taken by the B.A.I. to control avian tuberculosis. Reference is made to the importance to the pig industry of controlling avian TB.

Brief reference is made to the control of pullorum disease by the B.A.I. in conjunction with the National Poultry Improvement Plan inaugurated in 1935.

Among the other activities of the B.A.I. may be mentioned the testing of commercial disinfectants, the supervision of all poultry biological products, and the supervision of imported poultry to prevent introduction of diseases from abroad.

The Bureau of Agricultural Economics is responsible for inspection of table poultry; in addition it deals with statistics including data on seasonal mortality.

There is a well developed system of dissemination of information by the Department of Agriculture to poultry farmers on matters relating to the control of disease.

II. This is a general discussion. The industry of the U.S.A. is valued at about one billion dollars and diseases of poultry involve an expenditure of about one hundred million dollars annually. Certain trends are discussed that relate to the increase and decrease in the prevalence of diseases such as leucosis, fowl plague, fowl cholera, fowl typhoid, blackhead and pullorum disease, and suggestions are made concerning the lines upon which certain types of investigation of poultry disease problems should be carried out.

III. The data presented in this paper were obtained from the autopsy of about 7,000 chickens of laying age taken as dead birds or culls from the flock of the Division of Poultry Husbandry, University of California, and also from certain specialized poultry farms.

More than half of the deaths were apparently the result of nonspecific pathological conditions. An account is given of the findings. Over 80% of the lesions occurred in the alimentary, urinary or reproductive systems. In chickens 6–12 months old, lesions were mostly confined to the alimentary system and the predominating lesion was degeneration and rupture of the liver resulting in internal haemorrhage. Inflammation of the proventriculus and intestines were other significant pathological changes. About 40% of all nonspecific primary lesions were found in the reproductive system and were characterized by ruptured yolk and peritonitis and inflammation and occlusion of the oviduct. B. refers to the finding of

Bacterium coli associated with this condition from a number of these cases the condition being particularly common in culls over a year old. Derangement of the urinary system characterized by enlarged kidneys with retention of urates constituted about 20% of the lesions in the dead birds and slightly less in the culls.

It is emphasized that the high incidence of disease conditions unrelated to any specific infection will doubtless continue to be responsible for losses unless more attention is paid to such factors as nutrition, genetics, management, and environment.

IV. About 80 million poultry were kept in the Netherlands, and it is claimed that as a result of free veterinary service by the State, the mortality rate was low. Vaccines and sera were distributed only among veterinarians.

A summary of the results of autopsy made on poultry sent for examination during the last ten years is shown in a table. The prevalence of neurolymphomatosis and coccidiosis tended to increase, whereas fowl plague, fowl cholera and fowl typhoid, which were previously known to be common, seldom occurred. It is mentioned that fowl pox was successfully controlled by inoculation with a mixture of fowl pox and pigeon pox viruses. [In Great Britain and India the control of fowl pox by vaccination with pigeon pox virus alone has been satisfactory]. Testing of all breeding poultry for *Salmonella pullorum* was compulsory. Laryngotracheitis was still unknown in the Netherlands. Tuberculosis (avian) did not appear to be a serious menace; it was believed that this might be due to culling older hens and good control measures. In experiments carried out to determine the aetiology of fowl paralysis the author failed to establish that a virus was the causal agent.

Attention was drawn to the potential value of raising disease resistant birds.

V. In Italy, fowl cholera, fowl plague and fowl pox are the common poultry diseases.

State regulations enforce control methods which include strict hygienic and sanitary measures combined with prophylactic inoculations where possible; these measures are applied by the veterinary surgeons with the assistance of the experimental zooprophylactic stations. On the outbreak of an infectious disease, sanitary precautions are enforced and are relaxed only 15 days after the last date of occurrence of the disease.

Blood testing for *Salmonella typhi-murium* infection has been made essential for all farms authorized to distribute poultry for the improvement of stock in Italy.

VI. In Egypt about 75 million chickens are hatched every year and the industry is mainly carried on by country women. The important infectious diseases of poultry are fowl plague, fowl cholera, fowl typhoid, bacillary white diarrhoea, fowl diphtheria, fowl pox, spirochaetosis and piroplasmosis. The last two diseases are described and discussed at length.

Reference is made to piroplasmosis in geese caused by a parasite indistinguishable from *Aegyptianella pullorum* of fowls described by CARPANO in 1928. Dual infection with spirochaetes and piroplasms in birds is known to occur.

The measures adopted by the state for combating poultry diseases are described.

VII. A brief comment on the status of the duck raising industry on Long Island is followed by a discussion on great losses that have occurred from infectious diseases in ducklings. *Pasteurella aviseptica* and *Pfeifferella anatipestifer* infections have caused losses; vaccination with chemically killed bacterins is recommended for control, together with the necessary hygienic measures [see *V. B.* **9.** 608]. Other diseases such as Keel disease (*Salmonella anatum* infection); aspergillosis, rickets and botulism also cause small losses. [See *V. B.* **3.** 178; **5.** 472, and **9.** 7., for an account of *Pf. anatipestifer* infection; there seems to have been no record of this disease from other parts of the world.]—S. G. IYER.

WATKINS, C. V. (1940). **Some Remarks on Two Diseases Affecting the Lungs and Air-Sacs in Poultry. 1. Air-sac Mites (Cytoleichas nudus). 2. Brooder Pneumonia or Aspergillosis of Chicks.**—*Vet. J.* **96.** 207–210. 4 figs. on 1 plate.

According to most text-books, air sac mites are regarded as harmless, but W., as a result of his own observations, considers their presence in the lungs and air sacs of fowls to be of pathological significance. Similar views have been expressed by other workers [see *V. B.* **10.** 180.]. The incidence of this condition is generally associated with poor management. Some of the affected birds have been tuberculous. W. suggests that the mites may possibly serve as vectors in the spread of TB. in affected flocks, or that by their irritant action upon the

lungs they may render fowls more liable to contract the disease.

W. also discusses the relationship of these mites to aspergillosis. During a period of two years (1937–39) aspergillosis was found in 10% of chicks from Devon and Cornwall which were submitted to a routine cultural test for pathogenic moulds of the lungs. More than half of the 30 cases of aspergillosis were complicated by other bacterial infections, *Salmonella pullorum* being implicated in 12 cases.—S. G. I.

ALIKAEV, V. A. (1940). Profilaktika bolezneĭ porosyat v rabote peredovikov svinovodstva. **[Prevention of Piglet Diseases as Practised on Model Breeding Estates].** —*Sovyet. Vet.* No. 1. pp. 56–60.

It is stated that on two pig-breeding farms in various districts of the U.S.S.R., piglet losses were not above 0·5–0·6%, and in two others there were no losses at all. In one district of the Minsk region, piglet losses averaged only 2·7% and in one district of the Odessa region only 0·6%. Before 1917, the piglet losses on the best pig-breeding farm in Russia were 37·6%. In 1925–26 losses averaged 21·2%.

The measures taken to ensure these results are described as follows :– sows are carefully selected for their breeding qualities and given a balanced diet during pregnancy; the sties are dry, well-lit and warm; ample exercise is given, and the sows are cleaned and groomed. Sows about to litter are put in a disinfected sty, are washed and their hindquarters disinfected. After farrowing, umbilici of piglets and teats are cared for. As anaemia of piglets is regarded as being due to an iron deficiency, iron is administered to all animals by various methods. The administration of red clay is also practised. Much attention is given to the diet of suckling sows. They are exercised daily both winter and summer and laxatives given. The udder and teats are kept clean and frequently disinfected.

From the age of three weeks, piglets are given cow's milk in addition to the milk of the mother and milk soured by the action of *Bacillus acidophilus* is administered from the second day after birth. Chalk, bone-meal, and charcoal in small quantities also form part of the diet, and from the 5th–7th day onwards, oat and barley gruel are fed to the piglets. Enzootic broncho-pneumonia is controlled by keeping the sties dry, warm, and clean, and providing sufficient space, ventilation and exercise. Piglets are weaned by degrees at the age of two months and fed 4–5 times per day. In order to avoid the entry of infection through weak animals with reduced resistance, those which show slow development are separated from the rest and given special diets suited to their requirements. Plentiful feeding of foods rich in vitamins and the administration of cod liver oil from the age of 15 days completely prevented the appearance of rickets.—E. M.

MUNCE, T. W. (1940). **"Forage Poisonings" in Horses.**—*Vet. Ext. Quart. Univ. Pa.* **40.** No. 79. pp. 20. [9 refs.]

Under this heading comments are made on several diseases. (1) Botulism, which is now reported less frequently than formerly, but should still be looked for. (2) Mouldy corn (maize) poisoning which only affects horses: the exact aetiology is unknown. The most outstanding lesions are areas of liquefaction necrosis in the white matter of the brain. (3) "Cornstalk disease" of horses and "cornstalk disease" of cattle, these conditions being separate entities. (4) Hydrocyanic acid poisoning due to the ingestion of certain damaged plants. (5) Damaged sweet "corn" (maize) disease, the exact cause of which is not known; it affects mostly cattle and sheep and is characterized by haemorrhages both internal and external. (6) The group of diseases known as clover disease, buckwheat poisoning, photosensitization, and bighead in sheep; considered by most authorities to be manifestations of photosensitization. (7) Selenium poisoning.
—R. FISHER.

THOMSON, W. M. (1940). **An Interpretation of the Clinical and Laboratory Findings in Azoturia.**—*Cornell Vet.* **30.** 341–349. 2 tables. [Numerous refs.] [Reprinted in *Vet. Rec.* **52.** 785–788 (1940)].

T. reports the important finding of a deficiency of vitamin C in the serum of horses affected with azoturia [myoglobinuria paralytica (see *V. B.* **1.** 234)]. In 12 cases of azoturia the ascorbic acid content of the serum was found to range between zero and 0·35 mg. per 100 c.c. In 13 normal horses the corresponding values were 0·23–0·8 mg. per 100 c.c. T. discusses the recognized groups of symptoms in azoturia with reference to the known physiological actions of ascorbic acid in body metabolism. [As this discussion contains numerous quotations from the relevant physiological literature, it does not lend itself to adequate abstraction and should, therefore, be read in the

original.] T. concludes that there is not sufficient evidence to prove completely the theory that ascorbic acid deficiency in the serum is the cause of azoturia in horses.—N. J. S.

FERNENGEL, E. (1936). Ueber eine paroxysmale Hämoglobinurie bei Jungrindern. **[Paroxysmal Haemoglobinuria of Young Cattle].**—*Inaug. Diss., Hanover.* pp. 53. 15 tables, 4 graphs. [4 refs.]

F. records his observations on four cases of haemoglobinuria in young cattle confined indoors at a clinic of Hanover Veterinary College. Attacks of haemoglobinuria came on a short time after the drinking of large amounts of warm or cold water and were evidently a consequence of it; the opinion was given that the bloodstream was temporarily swamped by the hypotonic water, resulting in the lysis of many red blood cells and the liberation of haemoglobin which was excreted in the urine.
—J. E.

HORNBOGEN, F. (1938). Das Verhalten des Blutes bei der experimentell erzeugten paroxysmalen Haemoglobinurie der Kälber. **[Blood Picture in Experimentally Produced Haemoglobinuria in Calves].**—*Inaug. Diss., Berlin.* pp. 42. 7 figs., 8 tables. [5 refs.]

This is an account of experiments similar to those recorded by FERNENGEL [see preceding abst.], in which paroxysmal haemoglobinuria was produced in young bovines by giving large quantities of water—usually 10–11 litres at 15–20°C. Haemoglobinuria followed in eight out of 14 experiments using four bovines altogether, the urine giving a positive benzidine test usually between the second and sixth hours after the water had been drunk. Examination of the blood at intervals showed in most experiments a decrease in the red cell and leucocyte counts, which could be attributed in part to hydraemia due to excessive water absorption.

The disease occurs spontaneously in Holland and Italy, but the aetiology is obscure.
—E. G. WHITE.

BROWNLEE, A. (1940). **Histo-Pathological Studies of Scrapie, an Obscure Disease of Sheep.**—*Vet. J.* **96.** 254–264. 1 fig. on 1 plate, 1 appendix. [10 refs.]

B. confirms that, apart from traumatic lesions induced by rubbing of the skin, no consistent gross pathological changes occur in scrapie. He has made P.M. examinations, including minute examination of the entire central nervous system in several cases, with negative result. He details his findings in an appendix, the only significant lesion being vacuolation of large neuron cells of the medulla and cord, which was noted in 24 typical cases. The cells appeared otherwise healthy, there being no disintegration of the Nissl substance as described by BESNOIT and MORREL (1898). Usually the vacuolated cells were scanty, but in a few cases they were extensive. Findings in the C.N.S. of sheep affected with louping-ill are compared, the vacuoles being smaller and the affected cells always necrotic. Sheep affected with other chronic diseases had no vacuoles in the neuron cells of the medulla or cord. B. also notes that vacuoles similar to those in the neurons of scrapie sheep may occur in the spinal ganglia of apparently normal sheep. Sarcocystic infestation was not more extensive in scrapie sheep than in normal sheep.
—C. V. WATKINS.

ROBIN, N., & CHARTON, A. (1939). La lipoïdose cornéenne du chien. **[Canine Corneal Lipoidosis].**—*Rec. Méd. vét.* **115.** 321–331. 2 figs. [4 refs.]

During a period of several years the authors have encountered about 30 cases of corneal lipoidosis. The condition appears as a white, round, or oval opacity, seldom more than 3–4 mm. in diameter, confined to the corneal parenchyma. It is centrally placed and is always bilateral. Microscopically, the most important alterations are found in the posterior layers of the parenchyma. There, between the lamellae converging towards the centre of the opacity, are found particles of fat and also large cells with oval nuclei and extensive protoplasm, filled with fat droplets (lipoidophages). A characteristic feature is the complete absence of any signs of inflammation, and there is never any extension to the epithelium. The blood was analysed to determine whether an increase in the cholesterol content was associated with the cause of the eye change, and it is suggested that the deposition of fats and cholesterol may be favoured by the extreme slowness of the interstitial circulation of the cornea. Medicinal treatment is of no avail and ablation of the opacity is recommended, details of the technique being given. Comparison is made with a similar condition in man.—J. R. LAWSON.

KELLER, K., & SCHOTTERER, A. (1938). Genitalmissbildung (Intersexualität) bei Drillingsfötен des Rindes in der Art der

" unfruchtbaren Zwillinge " (Zwicken). **[Genital Malformation (Intersexuality) in Triplet Calf Foetuses of the Free-Martin Type].**—*Z. mikr.-anat. Forschr.* **43.** 77–106. 8 figs. [Abst. from abst. in *Anim. Breed. Abst.* **7.** 219. Signed: H. MERTON].

The triplet foetuses described were from originally distinct ova, since three corpora lutea were formed in the ovaries. One foetus had normal male genital organs and an entirely male appearance. The other two had female external genitalia, but their genital organs exhibited more definite intersexual hypoplastic malformations than those usually found in free-martins. A description of these organs is given and it is suggested that these observations support the view that the moment of anastomosis of the placental circulation decided the degree of intersexuality.

COOPER, E. R., & WALKER, D. (1940). **Climatic Factors Relating to Outbreaks of Facial Eczema in New Zealand.**—*N.Z. J. Sci. Tech.* **22.** 30A–41A. 4 figs., 8 tables. [1 ref.] [Authors' summary copied *verbatim*].

Meteorological data collected at a number of towns in the North Island, New Zealand, have been examined with a view to determining whether the summers of 1935 and 1938, when serious outbreaks of facial eczema occurred in sheep and cattle, were outstanding meteorologically. The evidence shows that air and soil temperatures were higher during 1935 and 1938 than for any other summer included in the period 1915–39.

JÁRMAI, K., & BALÓ, L. (1938). Künstliche Erzeugung der Hühnerleukose. **[Experimental Fowl Leucosis].** — *Dtsch. tierärztl. Wschr.* **46.** 593–596. [11 refs.]

Hens treated subcutaneously with 0·1 c.c. of benzol-tar (0·3 c.c. coal tar dissolved in 30 c.c. benzol) at intervals of 10 days for 7 months, developed a non-transmissible myeloid leucosis. Transmissible erythroleucosis was obtained in two cases after intramuscular injection of benzpyrene dissolved in oil, but it could not be decided whether these arose spontaneously or as a result of the treatment.

Hens treated with " maretin " [similar to antifebrin] developed a blood picture corresponding to myeloid leucaemia, transmissible only to the second generation.—SASSENHOFF.

STUBBS, E. L. (1940). **A Study of Fowl Paralysis.**—*Vet. Ext. Quart. Univ. Pa.* **40.** No. 78. 8–13.

Experiments are described showing attempts to transmit fowl paralysis from affected fowls to apparently healthy fowls by using blood and nerve tissue. The blood injections were made in 0·5–1 c.c. amounts into a vein. The nerve suspensions were injected into the bundles of the right sciatic nerve.

In the first experiment twelve fowls were injected intraneurally with the nerve emulsion from affected Rhode Island Reds. None developed fowl paralysis. After six months all were destroyed; no lesions were found P.M.

In the second experiment nerve emulsion from affected White Leghorns was injected intraneurally into six healthy fowls. The results were negative. After five months these fowls were destroyed and P.M. examination revealed no lesion of fowl paralysis.

In the third experiment two healthy fowls were inoculated with blood and nerve suspensions from an affected Barred Plymouth Rock pullet. Sections of the nerves from this fowl, however, showed no cellular infiltration typical of fowl paralysis, but there was oedema and degeneration of the nerves. Both inoculated birds developed paralysis, one, two months and the other, seven months after the injections. Blood and nerve material from one of these fowls, in the nerves of which fowl paralysis lesions were present, was injected into five other fowls with the result that one fowl developed paralysis one month after the injection. This fowl was destroyed, and blood and nerve suspensions were further subinoculated into six healthy experimental birds. None showed paralysis. One fowl, however, which died six months after the injections showed enlarged liver and spleen characteristic of lymphoid leucosis. The remaining fowls were destroyed six months after the injection. None revealed any signs of fowl paralysis P.M.

[It is interesting to note that in the third experiment in which two cases of fowl paralysis occurred in the first passage, the seed material contained no cells the presence of which is regarded as typical of this disease].

—S. G. IYER.

MEMBER, S., BRUGER, M., & CHASSIN, M. R. (1940). **Serum Cholesterol in Horses During Immunization with Pneumococci. Including a Note on the Hypercholesterolemia of Infectious Anaemia.**

—*J. Immunol.* **38.** 355–363. 3 tables. [20 refs.]

Determinations of total and ester cholesterol in the serum of horses immunized with pneumococci showed that in the early stages no significant deviation from the normal occurred, but that a definite decrease was obtained in the later stages of immunization. A pronounced hypercholesterolaemia was associated with the fever resulting from repeated injection of suspensions of pneumococci and also of the virus of infectious anaemia.—ALFRED EDEN.

I. AUBERTIN, E., LACOSTE, A., & CASTAGNOU, R. (1939). Sur le pouvoir toxique de l'hémoglobine administrée par voie veineuse chez le chien. **[Toxic Power of Haemoglobin Given Intravenously to Dogs].**—*C. R. Soc. Biol. Paris.* **132.** 129–131. [2 refs.]

II. AUBERTIN, E., LACOSTE, A., & CASTAGNOU, R. (1939). De la néphrite hémoglobinurique expérimentale. **[Experimental Haemoglobinuric Nephritis in Dogs].**—*Ibid.* 132–134.

III. LACOSTE, A., AUBERTIN, E., & CASTAGNOU, R. (1939). Observations sur l'élimination renale de l'hémoglobine. **[The Renal Elimination of Haemoglobin].**—*Ibid.* 135–136. [5 refs.]

IV. LACOSTE, A., AUBERTIN, E., & CASTAGNOU, R. (1939). Sur la destinée des produits d'élimination hémoglobiniques immobilisés dans les reins et sur les réactions histo-pathologique liées à cette immobilisation. **[The Fate of Haemoglobin Elimination Products Immobilized in the Kidneys and on the Histopathologic Reactions Connected with this Immobilization].**—*Ibid.* 137–138.

V. AUBERTIN, E., LACOSTE, A., & CASTAGNOU, R. (1939). Teneur en fer des divers organes chez des chiens subi une injection d'hémoglobine dans les veines. **[Iron Content of the Organs of Dogs which have had Intravenous Injections of Haemoglobin].**—*Ibid.* 139–141.

VI. AUBERTIN, E., LACOSTE, A., & CASTAGNOU, R. (1939). Étude comparative des gaz du sang chez des chiens, en état d'anémie aigue par saignée, traités ou non ultérieurement par une injection intraveineuse d'une solution d'homo- ou d'hétéro- hémoglobine, de sang de chien ou de sérum physiologique. **[Study of the Blood Gases of Dogs with Acute Blood Loss, Treated or not by an Intravenous Injection of Homo- or Hetero-Haemoglobin, Dog's Blood or Saline].**—*Ibid.* 141–144. 2 figs. [2 refs.]

I. Experiments were carried out over a period of three years on the effect of intravenous injections of haemoglobin into dogs made acutely anaemic by withdrawal of 30–50 c.c. of blood per kg. body weight; solutions of various strengths of haemoglobin from the horse or dog were given in slightly smaller quantities than the amount of blood withdrawn.

The authors believe that the most important factor influencing toxicity to the kidney is the strength of the haemoglobin solution, and that a 6·5% solution in which the density, surface tension, viscosity and osmotic colloidal pressure most closely approach those of the blood plasma of the dog, is the least toxic.

II. Five clinical varieties of experimental haemoglobinuric nephritis are described with their principal symptoms, *viz* :–

(1) An anuric form with anorexia, vomiting, progressive torpor and death in a few days. A slow and steady increase in all the blood N.P.N. fractions occurs. There is no oedema, ascites, dyspnoea, convulsions nor coma.

(2) An oliguric form, with death supervening less rapidly. Symptoms are less acute, at least at the onset of the condition.

(3) A form showing transitory oliguria but persistent nephritis which, however, is often curable. The animal does not appear ill; anorexia only exists for a day or two and may even be absent.

(4) A discreet and transitory variety, showing oliguria for 24–36 hours. Casts and haematin are present in the urine, but all symptoms usually disappear within a week.

(5) A form which is almost concealed and occurring in animals treated with solutions of 6·5–7% of haemoglobin. It is only revealed by slight symptoms such as a diminution of diuresis some hours after haemoglobin has been injected, or the presence of urinary casts and haematin in minute quantities. It may be due to faulty technique in preparing the haemoglobin.

In all these cases of nephritis the liver is unaffected except perhaps towards the end of fatal cases.

III. The study of the kidneys of dogs which had been killed 24 hours after receiving intravenous injections of a 14% solution of

haemoglobin from the horse, show that there are two processes involved in the elimination of part of the haemoglobin, a process of glomerular filtration and a process of exocrine secretion of the cells of the tubules of the renal medulla, the latter being the more active.

IV. In most cases of epithelial nephritis, acute or chronic, the passage through the kidney of very concentrated solutions of haemoglobin becomes complicated with a persistent and abundant retention of haemoglobin elimination products. Portions of the tubules responsible for reabsorption and excretion become obliterated, and this interferes mechanically with the function of the kidney. One of the most typical manifestations of this condition is the direct transformation of haemoglobin into bile pigment without its passing through the haemosiderin stage. The intracellular immobilization of these pigmentary derivatives produces a degeneration of the epithelial cells concerned and brings about accompanying reactions associated with phagocytic and, later, cicatricial effects.

V. Dogs from which 30 c.c. of blood per kg. body weight had been previously withdrawn, were injected with a slightly smaller amount of a solution of haemoglobin. The pigment in the plasma gradually decreased over a period of 48 hours when a 14% solution was injected, in less than 24 hours when a 6·5% solution was used and in about 12 hours when a 3·5% solution was given. The amount of the haemoglobin eliminated by the kidneys depends upon the diuresis and also upon the quantity administered. In dogs treated with a 6·5 solution the amount eliminated averaged 33% of the amount injected. The remainder was distributed throughout the tissues. As it was not possible to determine the haemoglobin directly, the iron content of various organs was estimated. This was done after removing the red blood cells from the tissues by means of irrigating the animal for two hours with Ringer-Locke solution, allowing 12–15 litres to pass through the circulatory system. After removal, the organs were subjected to further irrigation and a final washing with distilled water.

The results of the iron estimations showed that the liver, spleen, lungs, and kidneys contained most of the haemoglobin circulated in the plasma. A little was found in the pancreas, but the muscles, heart, brain, and alimentary tract retained none.

VI. Of 16 dogs, from which 30 c.c. of blood per kg. body weight had been withdrawn, a series of four dogs received injections of a 6·5% solution of haemoglobin, and a second series of four received injections of a 3·5% solution, the haemoglobin for two in each series being taken from dogs and for the other two from horses. Of the remaining eight dogs, two received an injection of a 14% solution of horse haemoglobin, two dogs of similar blood grouping were used for transfusion, two received injections of physiological saline and the remaining two, as controls, received no treatment after bleeding. The results suggest that, whilst the injected haemoglobin encourages haematosis and the carrying of oxygen to an extent sufficient to afford immediate relief in case of serious haemorrhage, the beneficial effects are not of long duration, for the haemoglobin is gradually eliminated from the plasma and, further, part is slowly converted into inert methaemoglobin.—H. V. H.

Batson, O. V. (1940). **The Function of the Vertebral Veins and their Rôle in the Spread of Metastases.**—*Ann. Surg.* **112.** 138–148. 8 figs. [13 refs.] [Author's summary copied *verbatim*].

Many metastatic tumors and abscesses do not fit readily into accepted explanations for tumor spread. The absence of lung involvement has been a constant stumbling block to current theories. Even an open foramen ovale has been used to explain metastatic paradoxes.

The vertebral veins with their rich, valveless ramifications and connections offer a possible solution to the difficulty. Injections into this system by way of the deep dorsal vein of the penis gives a pattern duplicating typical prostatic carcinoma spread. Injection of breast venules seems to duplicate the pattern of aberrant breast cancer spread, *i.e.*, spread into the spine, the ribs, the shoulder girdle and the skull.

Injection experiments in living monkeys, with simulated abdominal straining, show that the venous flow from pelvic veins is into the vertebral vein system.

The vertebral vein complex with its cranial and body-wall connections acts as a separate vein system. It may be either a venous pool, or it may be a venous by-pass for the other vein systems.

It is possible to explain most cases of aberrant malignant metastases, aberrant pyogenic metastases and aberrant embolism follow-

ing air injections by the demonstrated rôle of the vertebral vein system.

It is proposed that the veins of the brain, skull, neck, viscera, vertebral column (together with their valveless connections in the girdles) and the body-wall veins be considered a separate, although overlapping, system of veins. We suggest, for brevity, that the term vertebral veins be used to indicate this system. According to this concept the venous systems consist of the caval, pulmonary, portal and vertebral divisions.

HYDE, R. R. (1939). **Infectious Myxomatosis of Rabbits (Sanarelli) versus the Fibroma Virus (Shope) with Especial Reference to the Time Interval in the Establishment of Concomitant Immunity.**—*Amer. J. Hyg.* Sect. B. **30.** 47–55. 3 plates, 1 table, 1 chart. [5 refs.] [Author's summary copied *verbatim*].

The clinical manifestations of myxomatosis in rabbits may be greatly modified by intradermal injections of the fibroma virus. If the fibroma virus is injected 48 hours previously to the myxoma virus the response is greatly limited and the animal usually survives. If the myxoma virus is injected after an interval of 96 hours the lesion is usually limited to the site of injection and there are but slight if any constitutional symptoms. Nodular formation external to the central lesion is determined largely by the state of immunity as measured by the time interval between injections and the amount of myxoma virus injected.

The nodular formation appears to be an expression of the state of immunity of the host to the potency of the virus as measured by the number of infective units. The immunity that results from the treatment of the rabbit with active fibroma virus would seem to be essentially of a cellular nature although complement-fixation antibodies of appreciable titer are present. It was shown that: (1) serum from the normal rabbit gave no fixation for either the fibroma or the myxoma virus; (2) serum from the fibroma rabbit gave a higher titer with the fibroma antigen than with the myxoma antigen; (3) serum from the fibroma-myxoma rabbit fixed complement to approximately the same degree with both antigens.

HYDE, R. R., & GARDNER, R. E. (1939). **Transmission Experiments with the Fibroma (Shope) and Myxoma (Sanarelli) Viruses.**—*Amer. J. Hyg.* Sect. B. **30.** 57–63. 2 tables. [3 refs.] [Authors' summary copied *verbatim*].

1. Previous claims to the effect that the fibroma virus does not spread by contact are confirmed.

2. The placenta of the rabbit acts as a barrier to the passage of the fibroma and myxoma viruses.

3. The fibroma virus is not transferred to the suckling young through the mother's milk.

4. Protective antibodies from the fibroma-immune rabbit are not transferred through the milk to the nursing young.

5. The young born to fibro-myxoma-immunized rabbits are apparently as susceptible to myxoma as the young born to untreated parents. The immune state is neither transmitted nor inherited.

BRYAN, W. R., & BEARD, J. W. (1940). **Factors Determining Frequency Distribution of Lesions Induced by Papilloma Protein and Vaccinia Virus.**—*Proc. Soc. exp. Biol., N.Y.* **43.** 380–382. 1 fig. [5 refs.]

According to PARKER [*V. B.* **9.** 316.], statistical evidence suggests that the frequency distribution of vaccinia lesions is related to the chance distribution of virus particles. The authors question this concept which is based on the resemblance of the observed frequency to the theoretical Poisson frequency expected if a single virus particle causes infection: they have re-examined the data of Parker together with figures obtained with papilloma virus, by the method of least squares. Their results indicate that the dose response curve is determined not by chance presence or absence of virus particles, but by variations in host resistance.—R. E. GLOVER.

PARSONS, L. Dorothy. (1938). **Changes in the Lymph Glands of Tumour-Bearing Mice.**—*J. Path. Bact.* **47.** 501–523. 35 figs. on 15 plates, 5 charts, 3 tables. [7 refs.] [Author's summary copied *verbatim*].

1. Changes in the lymph glands of mice bearing tumours produced by different methods are described and compared. These are found to be very similar, and include proliferation of the reticular system, disappearance of lymphocytes and the presence of iron-reacting deposits in the macrophages of the glands.

2. Experiments with the Mal. sarcoma show that marked changes have developed in recent years in the behaviour of the grafted tumour, which can now be propagated both by ordinary

grafts and by injection of the blood of a sarcoma-bearing mouse.

3. Widespread changes occurring at an early date in the lymph glands of grafted mice are described, and appear to be of two types, namely a lymphoid hyperplasia and an apparently sarcomatous change.

4. Lymph glands normal in appearance or showing either variety of change can, when taken 5 days or later after inoculation of the sarcoma into a mouse, produce sarcomas.

5. Experiments with sarcoma S 37 have shown that it behaves in these respects like the Mal. sarcomas.

KIDD, J. G. (1940). **Serological Studies in Relation to the Problem of Tumour Causation.**—*J. Bact.* **39.** 349–364. 4 tables. [Numerous refs.]

Since the establishment of the presence, in rabbit skin papillomata induced by viruses, of a specific, serologically active substance of a highly distinctive nature, intimately associated, and in all probability identical with, the virus responsible for the growth [see *V. B.* **9.** 853.], K. has attempted to find out if substances of a similar nature are present in tumours whose cause is unknown. The tumour chosen for this work was the Brown-Pearce rabbit carcinoma—a malignant, anaplastic, epidermoid carcinoma.

Using the complement-fixation reaction, K. has been able to demonstrate constantly the presence, in saline extracts of the tumour, of a highly specific complement-fixing antigen which is not found in extracts of normal rabbit tissues. Unlike tissue antigens, it appears to have a large particle size and weight and is not soluble in alcohol. In these and other properties, the Brown-Pearce antigen closely resembles that of the virus papilloma, from which, however, it is antigenically distinct. Though extracts containing the Brown-Pearce tumour antigen have so far failed to produce tumours when injected into rabbits, this does not exclude the possibility that it may be responsible for the growth. Attention is drawn to the need for similar work on other tumours of unknown causation.—J. W. WHITTICK.

NUTRITION IN RELATION TO DISEASE

FERGUSON, W. S., LEWIS, A. H., & WATSON, S. J. (1940). **The Teart Pasture of Somerset. Cause of Teartness and its Prevention.**—*Bull. Jealott's Hill Res. Sta., Bracknell.* No. 1. pp. 28. 3 figs., 1 appendix.

The novelty of the subject matter and the fact that the information is conveyed in the form of a bulletin addressed to farmers, pending later publication of further experimental data in the scientific press, justifies a lengthy abstract for readers of the *Veterinary Bulletin*.

The local word " teart " [*i.e.* tart] is applied to land and pastures in Somerset upon which severe scouring occurs in grazing ruminants, particularly cows in milk and young stock. Sheep are less affected, and horses and pigs appear to be unaffected. The area concerned in Somerset is estimated at about 20,000 acres and similar land occurs in Warwickshire and Gloucestershire. Affected soils are associated with the lower lias geogological formation. Most affected farms contain both teart and non-teart land and the degree of " teartness " varies with season and from field to field.

Scouring usually starts within a few days of putting stock on teart pastures and quickly ceases if the animals are transferred to non-teart pastures. Affected cattle become filthy, develop staring coats and rapidly lose condition. Red Devon cattle turn dirty yellow and black beasts become rusty in colour.

The cause of teartness is traced to the presence of molybdenum in the herbage in amounts varying from 20–100 p.p.m. of the dry matter, and the degree of teartness is roughly proportional to the molybdenum content, particularly to the amount in water-soluble form. Of the total molybdenum present, about 80% is soluble in the case of green grass, about 40% in the case of hay, and 10% in the case of moribund winter herbage. Hence growing pastures may be teart even when cut hay is not.

Incorporation of sodium molybdate in the rations of cows in amounts equivalent to that which would be consumed on teart pasture reproduces the symptoms of the disorder, and the herbage on soils dressed with sodium molybdate absorbs large amounts of molybdenum and causes scouring. After experimental dosing of sheep with sodium molybdate about three-quarters of the molybdenum appeared in the faeces and one-quarter in the urine, thus

indicating considerable absorption into the blood stream.

In the search for an antidote, salts of copper, cobalt, and iron were tried. Ferric chloride was only inadequately effective in controlling the diarrhoea even after five doses of 2 g. each, but copper sulphate in daily doses of 1–2 g. for cows and 0·5–1·0 g. for calves, was effective within a few days and the animals appeared normal in a week. These quantities are recommended as safe for incorporation in concentrated feed over the grazing season—most conveniently in the form of ½–1 lb. of a palatable cake containing 10 lb. of copper sulphate per ton.

With regard to pasture management, procedures which discourage Yorkshire fog and limit undue abundance of clover reduce teartness. Basic slag and lime, by increasing the proportion of leafy clover increase the molybdenum intake of grazing animals. Sulphate of ammonia increases the yield of pasture grass but reduces its molybdenum content.

Wherever possible, however, it is advisable to convert teart pastures to arable land.

—H. H. Green.

Tyler, C. (1940). **Studies of Calcium and Phosphorous Metabolism in Relation to the Chemical Structure of Bone. I. Experiments with Laying Birds.**—*Biochem. J.* **34.** 202–212. 3 figs., 8 tables. [10 refs.]

Metabolism trials were conducted on laying pullets and hens fed on an adequate diet low in Ca, with added Ca as (a) carbonate, (b) gluconate, and (c) sulphate. Daily analyses for Ca and P on food, excreta and eggs enabled balances to be struck. From the P balance the daily amount of Ca metabolized as $Ca_3(PO_4)_2$ of bone [Ca_p] was calculated and the difference between this figure and the actual Ca balance gave "residual Ca" [Ca_R]. The difference between food and excreted Ca was expressed as Ca_A and the egg-shell Ca on laying days as Ca_e. By a series of daily calculations with each source of Ca it was shown that the Ca fraction of the bone is chiefly concerned in egg laying. Results on 35 days of experiment showed that a withdrawal from the bone of over 1 g. Ca can occur on a laying day but that no more than 1 g. Ca can be laid down in bone on non-laying days. The relationship of food and bone Ca to egg-shell Ca is mentioned, and calculation of correlation coefficients showed that there is a reciprocal relationship between the Ca of $Ca_3(PO_4)_2$ and the residual Ca of bone. The implications of this are discussed.—A. Eden.

Ham, A. W., Littner, N., Drake, T. G. H., Robertson, E. C., & Tisdall, F. F. (1940). **Physiological Hypertrophy of the Parathyroids, its Cause and its Relation to Rickets.**—*Amer. J. Path.* **16.** 277–286. 4 tables. [12 refs.]

The article describes a series of four experiments carried out upon rats in order to clarify the relationship assumed to exist between rickets and parathyroid hypertrophy. As the parathyroids of the rat are extremely small and difficult to measure or weigh, the volume of the gland was estimated, and expressed in terms of squares of graph paper. The authors conclude that parathyroid hypertrophy is not necessarily associated with rickets; it occurs only in low calcium rickets and not in low phosphorus rickets. It develops when the blood calcium is low and the phosphorus is at normal levels. It does not occur when the blood phosphorus is raised and the calcium is kept at normal levels. Hypocalcaemia, instead of hyperphosphataemia is the primary cause of physiological hypertrophy of the parathyroids.

—H. V. Hughes.

Park, E. A. (1939). **Observations on the Pathology of Rickets with Particular Reference to the Changes at the Cartilage-Shaft Junctions of the Growing Bones.**—*Harvey Lect. 1939.* pp. 157–213. 12 figs. [Numerous refs.]

The pathological changes in rickets are secondary to some as yet incompletely defined upset of the blood mineral equilibrium, as a result of which the precipitation of calcium phosphate in cartilage and bone becomes irregular or ceases, and weak bones, with demonstrable histological changes, result. Since rickets occurs in all degrees of severity, its pathological changes may be only just perceptible, or, alternatively, so severe that they threaten the integrity of the skeleton.

There are two main pathological processes in the development of rickets:—(1) changes at the cartilage-shaft junction (c-s.j.), which P. believes to be fundamental, and (2) the formation of excessive amounts of osteoid tissue in the bone shaft. Schmorl (1909) regarded excessive osteoid formation as the earliest and most reliable sign of the disease, but P. states that he has repeatedly found cases in which it was absent, but in which indubitable evidences of rickets were present at the c-s.j.

The production of excessive osteoid tissue is described. Osteoid, *i.e.* bone free from lime salts, has different staining properties from normal bone, and in histological sections the osteoid coatings always appear as borders (staining pink with eosin) to the lime-salt-containing trabeculae (staining bluish gray with haematoxylin) or to the matrix substance of the cartilage. It is not, of course, peculiar to rickets, being found as a stage in normal ossification on the borders of the trabeculae; the difference in the osteoid in rickets and the normal state is entirely one of degree. If the osteoid borders appear abnormally broad and abundant a confident histological diagnosis of rickets may be made.

The first sign of rickets at the c-s.j. is failure of the usual lime-salt deposition in the layer of cartilage close to the shaft. The normal support afforded by the lime-salts is thus withdrawn, and the tissues bordering on the c-s.j. may give way and undergo compression. The circulation at the c-s.j. becomes deranged, and the orderly invasion by the blood vessels ceases, to be replaced by a disorderly invasion. Meanwhile, the proliferative cartilage has begun to increase in amount and to become more resistant to invasion. These various changes are examined in considerable detail by P., the discussion being based upon laboratory findings, including those of DODDS and CAMERON [*V. B.* **9.** 266.], and upon clinical material. There is an accompanying series of photomicrographs and drawings of cleared specimens. P. concludes that, under the conditions of rickets, the blood vessels themselves inhibit lime-salt deposition in their pathways, and that, as the variations in the circulation of the shaft become greater, so do the corresponding defects in calcification. It is agreed that failure in lime-salt deposition is sufficient to account for the changes which transpire in the shaft, and for the enlargement of the blood vessels and the irregularity of their invasion, but it is suggested that the increased resistance of the cartilage, although it may be due to "mechanical" changes, is possibly the result of the inability of the matrix substance to undergo normal solution when in contact with the capillaries.

P. is convinced that halisteresis, the alleged withdrawal of lime-salts from the organic matrix of bone, does not occur in rickets. It will be recalled that THEILER [*V. B.* **5.** 583.], who reviewed the disease as it affected the domesticated animals, reached the same conclusion. [Readers are advised to read this lecture in full, and to see the instructive figures. —Ed.]—ALASTAIR N. WORDEN.

KRZYWANEK, F.W., & BRÜGGEMANN, J. (1939). Stoffwech selversuche mit alleiniger Verfütterung von Lecksuchtheu an kranke und gesunde Ochsen. I. Die Zusammensetzung der verfütterten Heusorten. **[Metabolic Experiments with Diseased and Healthy Oxen on a Diet of Hay which Causes Pica. I. The Composition of the Hays Used].**—*Biederm. Zbl.* **11.** 55–65.

The aetiology of the disease *Lecksucht*, literally "licking disease" and usually translated "pica", as it occurs in East Prussia, Schleswig-Holstein and other areas of Germany, is still obscure although investigated by OSTERTAG and ZUNTZ as far back as 1907. It is generally conceded to be a deficiency disease, not necessarily arising from the same deficiency in all areas. In Holland SJOLLEMA incriminated Cu deficiency for a similar disorder, and the aphosphorosis of South Africa was originally considered to resemble the pica of East Prussia. In Schleswig-Holstein alone it has been estimated that over a thousand cattle are affected yearly, mortality reaching 5–10% and indirect losses, from reduced live-weight and milk returns in relation to costs of husbandry, sometimes reaching 80–90%. The disease can be prevented by feeding foodstuffs imported from other areas, but local poverty limits this measure.

The present paper deals with detailed analyses of four samples of pica-producing hay and one sample of normal hay, compared with analyses of both normal and *Lecksucht* hays, by other authors. The usual data on protein, fat, fibre, and N-free extractions are given and the ash analyses include Na, K, Ca, Mg, Fe, Cu, Mn, Cl, P and S. Acid-base balance is expressed in terms of Ibele's E.A., A.A., and G.A. [Ca + Mg in relation to P; Na + K in relation to S + Cl; total basic in relation to total acidic constituents (see also *V. B.* **1.** 261)]. The net result is disappointing in the sense that no outstanding differences of aetiological significance could be established between hays from pica and non-pica areas.—H. H. GREEN.

FREER, G. H., & HAYDEN, C. E. (1940). **Suggested Therapy for Albuminuria in Dairy Cows at Parturition.**—*Cornell Vet.* **30.** 57–66. 2 tables. [3 refs.]

Albuminuria which varied from a trace to 0·861 g. per 1,000 c.c. of urine was found in ten cows which showed unusual symptoms at or near parturition. Glycosuria was evident in six cases. Increased protein intake was prescribed, but in most cases treatment was too diverse to support the specificity of the protein therapy, but it did seem helpful. Egg-white and later skimmed milk was prescribed, also linseed oil and mollasses to control constipation.
—R. Fisher.

Forbes, E. B., & Johnson, S. R. (1939). **Phosphorus Deficiency among Cattle in Pennsylvania.**—*Bull. Pa agric. Exp.* No. 371. pp. 25. 20 figs., 1 table.

Definite bovine aphosphorosis is a rare disorder in Pennsylvania, but discriminating search revealed it in both young and old cattle, particularly in cows during heavy lactation, wintered too largely on the less nutritive roughages such as straw and corn stover (maize roughage) without adequate allowances of concentrates. When detected it was usually associated with general undernutrition due to poor consumption of the deficient roughage. The best preventatives were provision of a better balanced ration, with liberal rest between lactation periods, and free access to a mixture of bone meal and salt when conditions were exceptionally unfavourable.

Tabulated data of inorganic P of blood in relation to P content of feeding stuffs are given.
—H. H. Green.

Gorter, F. J. (1939). Gegevens omtrent het aandeel van het koper en het zink in de genezing van voedingsdepigmentatie en haaruitval bij ratten en katten. [**Value of Copper and Zinc for Cure of Depigmentation and Hair Loss in Rats and Cats**].—*Ned.-ind. Bl. Diergeneesk.* **51.** 347–358. 2 figs. on 1 plate, 1 table. [12 refs.] [English summary].

Bleaching of dark hair in experimental rats on laboratory diets had been observed as far back as 1923 by Hartwell and subsequently by numerous other authors. Causes were variously attributed to deficiency of protein, of components of the vitamin B complex, and of trace elements. G. himself in 1934 reported darkening of bleached hair after administration of Cu, and in the present paper the effects of both Cu and Zn are studied on 16 groups of rats and on two cats. It was found that anaemia and depigmentation were related only in that each may be a symptom of severe Cu deficiency. Zn has no influence on depigmentation of rats, so long as sufficient Cu is present, although Zn deficiency causes baldness; a deficiency of Cu, however, causes depigmentation no matter how much Zn is given. Cats, in contrast to rats, become both depigmented and bald when fed on a Cu deficient diet. The syndrome is, to a certain extent, corrected by feeding sufficient Cu and Zn, but not by either metal alone; the addition of liver to the diet cures it completely.—G. Williamson.

I. Oleson, J. J., Elvehjem, C. A., & Hart, E. B. (1939). **Nutritional Achromotrichia.**—*Proc. Soc. exp. Biol., N.Y.* **42.** 283–285. 1 table. [10 refs.]

II. György, P., & Poling, C. E. (1940). **Observations on the Factor Curative of Nutritional Achromotrichia. [Correspondence].**—*J. biol. Chem.* **132.** 789–790. [6 refs.]

III. Free, A. H. (1940). **Non-Identity of Gray Hair Produced by Mineral Deficiency and Vitamin Deficiency.**—*Proc. Soc. exp. Biol., N.Y.* **44.** 371–373. [7 refs.]

I. It was thought that the factor concerned with the maintenance of normal hair pigmentation in piebald or black rats may be related to some of the members of the vitamin B complex. Piebald rats developed achromotrichia within 6–10 weeks when fed a basal ration consisting of 67% sucrose, 18% purified casein, 4% salt mixture, 9% butter fat, 2% cod liver oil, with a supplement of 10 μg. thiamin, 20 μg. riboflavin and 10 μg. vitamin B_6 per rat per day. Addition to the diet of various liver fractions demonstrated that liver extract containing all the factors was very effective in curing this condition when fed at a level of 250 mg. per day; fuller's earth filtrate was also active when fed equivalent to the same level. Fuller's earth eluate, nicotinic acid, adenylic acid, factor W, and vitamin B_6 were completely without effect; pantothenic acid did not prevent the appearance of achromotrichia, but in most cases delayed the onset of the symptoms. From the results it appears that the dietary factor responsible for this condition is distinct from all other factors of the B complex which have so far been identified and associated with specific function in the nutrition of the rat.

II. Depigmentation of the fur (achromotrichia) was observed in a group of rats kept on a basal diet deficient in vitamin B and supple-

mented with B_1, riboflavin, and B_6; in some cases cutaneous lesions also appeared which became severe and even generalized. When concentrates of pantothenic acid (75–200 μg.) with a degree of purification up to 40–50% were added to the basal diet, not only were the cutaneous lesions considerably reduced, but a blackening of the fur was definitely evident. It is pointed out that the hair did not become completely black after administration of pantothenic acid concentrates and depigmented areas often persisted. In several rats the blackening progressively increased with larger doses. These results explain those reported in I after the addition of pantothenic acid. It appears that concentrates of pantothenic acid with a purification up to 40–50% contain one factor, but not the only factor concerned in the cure of nutritional achromotrichia in rats.

III. Experiments on rats showed that the black hair of young piebald rats fed an exclusive diet of either powdered whole milk or fresh milk became rapidly and uniformly grey. A supplement of 0·25 mg. Fe, 0·05 mg. Cu, and 0·05 mg. Mn to the diet cured the greyness if it had developed, or prevented the occurrence of any change in the colour of the hair of rats on the milk diet since weaning. It has not yet been ascertained which of the three metals is responsible.

Supplements of rice bran extract rich in the factors of the B complex, were successful in restoring the black colour to the hair of rats made grey on a milk diet; control rats fed equal quantities of the ashed rice bran extract also became slowly black, indicating that the restorative effect is entirely due to inorganic substances in the rice bran preparation. Haemoglobin regeneration slowly occurred both in the rats receiving rice bran and in those receiving the rice bran ash.

Rats fed the synthetic diet described in I, with supplements of vitamins B_1, B_6 and riboflavin developed grey hair; addition of Fe, Cu, and Mn to these animals failed to prevent or cure the condition, but rice bran extract did effect a cure. This evidence seems to indicate that greying of black hair in rats may result from a deficiency of a factor or factors present in the vitamin B complex and may also result from a deficiency of Fe, Cu, and Mn.—R. Allcroft.

Alt, H. L. (1938). **Iron Deficiency in Pregnant Rats. Its Effect on the Young.**—*Amer. J. Dis. Child.* **56.** 975–984. 4 tables. [18 refs.] [Abst. in *Nature, Lond.* **142.** 1164, copied *verbatim*].

The author made a study of female albino rats which were fed with an exclusive diet of whole-milk powder and subjected to one or two pregnancies. He found that a single pregnancy did not cause anaemia but resulted in a marked depletion of the iron content of the liver, while a second pregnancy caused moderate anaemia due to deficiency in iron. The first litter of female rats with mild iron deficiency had normal haemoglobin values at birth, but there was a considerable reduction in the total iron content. The second litter of rats on a diet deficient in iron showed a decrease in the haemoglobin content of the blood at birth, and the total iron content of these animals was reduced to one fourth the normal. On the other hand, supplements of iron to the milk powder diet completely protected the mother and offspring against iron deficiency.

Caskey, C. D., Gallup, W. D., & Norris, L. C. (1939). **The Need for Manganese in the Bone Development of the Chick.**—*J. Nutrit.* **17.** 407–417. 1 fig., 5 tables. [19 refs.]

An examination of the bones of two lots of 100 Rhode Island Red chicks, which were fed low manganese and adequate manganese diets respectively, showed that a deficiency of Mn in the diet resulted in a significant shortening of the bones of the legs and wings as well as of the spinal column. The body conformation of the chick was thus altered, resulting in a stockier individual with a deeper body. This effect was not due to an alteration in the gross composition of the body, as the body composition of both lots of chicks was approximately the same.

The measurements of the leg bones of day-old chicks hatched from the eggs of hens fed low, medium, and high Mn diets showed that a Mn deficiency in the diet of the hen resulted in the development of short leg bones in the chicks.

The ash content of the bones of the chicks fed the low Mn diet was significantly lower than that of the chicks fed the adequate Mn diet. This was shown not to be due to the development of a rachitic condition, but it is concluded that Mn together with vitamin D is concerned with Ca and P metabolism in the chick.—R. A.

I. Morgan, Agnes F. (1940). **Deficiencies and Fallacies in Canine Diet.**—*N. Amer. Vet.* **21.** 476–483. [Numerous refs.] Discussion pp. 484–486.

II. Schlotthauer, C. F. (1940). **Fright Disease (Running Fits) Not a Deficiency Disease.**—*Ibid.* 355–356.

I. Many aspects of canine nutrition are touched upon in this paper but only a few observations on the relation of diet to health can be selected for notice.

During two years of experimental work, M. has observed a peculiar arching of the neck in all dogs on vitamin D deficient diets, and now regards its occurrence as a valuable sign of impending rickets. The symptom has not been reported hitherto. Breed is an important factor influencing the vitamin D requirement of dogs.

A vitamin A intake of 800 units per kg. per day does not maintain optimum health and breeding capacity. Hysteria has not been noted in dogs kept on vitamin B_1 deficient diets in the California laboratories, and M. believes that experiments now in progress are likely to confirm the work of Arnold and Elvehjem [*V. B.* **10.** 4.] on the dietary factors concerned in hysteria.

Brief details are given of the symptoms displayed by dogs suffering from deficiency of one or more of the following factors, vitamin B_1, riboflavin, vitamin B_6, nicotinic acid, and the filtrate or anti-grey hair factor. Enzootic blacktongue in dogs, like pellagra in human beings, is probably a multiple deficiency disease in which other factors of the vitamin B_2 complex are involved besides nicotinic acid.

II. This is a contribution to the discussion on Morgan's paper. S. reported failure to observe hysteria in vitamin B_1 deficient dogs and expressed the opinion that a hereditary epileptic tendency or infection with a neurotropic organism must exist in animals seized with hysteria. Where this is not the case, harmful substances must be present in the food, since vitamin deficiencies develop too slowly to be responsible for hysteria.—W. R. Muir.

Meyn, A. (1940). Ueber eine Mangelkrankheit der Schafe. [**A Deficiency Disease of Sheep**].—*Dtsch. tierärztl. Wschr.* **48.** 141–142. [10 refs.]

In the winter of 1939–40 losses were sustained in flocks of pregnant ewes in mid-Germany. The sheep were kept indoors and affected ewes showed general debility.

On veterinary investigation the disease proved to be due to malnutrition, as recovery followed the feeding of good meadow hay as a supplement to the previous diet of silage, straw and an [unspecified] concentrate. M. suggests that the trouble was avitaminosis A. As a preventative, sheep were given supplements of yeast, cod liver oil or a vitamin A preparation, and a salt mixture of calcium lactate, copper sulphate, and cobalt nitrate. No more losses occurred.—J. E.

Funk, C., & Funk, I. C. (1939). **The Action of Certain Hormones as Dietary Constituents.**—*Science.* **90.** 443–445. 4 tables. [3 refs.]

A study was made on rats of the effect of the addition of oestrin, testosterone propionate, and the gonadotrophic hormone of pregnant mare serum, to a diet which caused definite retrogression of the ovaries, uteri and testes. It is claimed that the sex organs of the male are more resistant to dietary deficiencies than those of the female. Addition to the diet of testosterone and gonadotrophic hormone produced a slight restorative effect. Oral administration of oestrin to females depressed the food intake, but testosterone and gonadotrophic hormones exerted rather a beneficial action on the food intake and weight. It is suggested that this effect can be regarded as evidence of the dietary significance of these two hormones.

—R. Allcroft.

Moore, L. A. (1939). **Relationship between Carotene, Blindness Due to Constriction of the Optic Nerve, Papillary Edema and Nyctalopia in Calves.**—*J. Nutrit.* **17.** 443–459. 5 figs., 2 graphs. [10 refs.]

Calves fed a low carotene ration developed night blindness (nyctalopia), papillary oedema and a permanent type of blindness due to constriction of the optic nerve associated with stenosis of the optic canal.

The development of these conditions could be prevented by supplementing the basal ration with crystalline carotene; it therefore appears that these conditions are part of the syndrome of vitamin A deficiency in calves. Papillary oedema persisted for a considerable time after feeding carotene.

No sign of xerophthalmia or keratitis was observed in these experiments. The bleaching

of the tapetum lucidum of the retina was found to be a good guide for the diagnosis of vitamin A deficiency in the bovine.—R. ALLCROFT.

HUGHES, E. H. (1939). **The Role of Riboflavin and Other Factors of the Vitamin-B Complex in the Nutrition of the Pig.** —*J. Nutrit.* **17.** 527–533. 2 figs., 2 tables. [8 refs.]

Pigs fed a riboflavin-deficient diet became crippled and grew very slowly; when riboflavin was added as a curative measure, there was an improvement in the physical well-being of the animals, but they did not recover from their crippled condition, indicating that some permanent injury had occurred, probably due to nerve degeneration. The necessity of thiamin for the pig was confirmed [see also *V. B.* **9.** 494]. Feeding a diet without rice-bran filtrate (which contains factors 1 and 2) resulted in slow growth and faulty gait, suggesting that one or both of these factors are necessary in the nutrition of the pig.—R. ALLCROFT.

MARGOLIS, L. H., MARGOLIS, G., & SMITH, Susan G. (1939). **Secondary Deficiency of Vitamin B_1 and Riboflavin in the Blacktongue Producing Diet.**—*J. Nutrit.* **17.** 63–76. 4 figs., 5 tables. [Numerous refs.]

Observations made on 33 dogs in which numerous attacks of experimental blacktongue were produced, demonstrated that riboflavin [B_2] and thiamin [B_1] were essential for the growth and well-being of the animals even when sufficient nicotinic acid was present to cure blacktongue. It is emphasized that although riboflavin and thiamin are factors essential to the dog, they have no curative effect on acute blacktongue and are not significant in the aetiology of the disease. It is concluded that under the conditions of these experiments both riboflavin and thiamin are secondary deficiencies of the blacktongue producing diet, and it appears that the dog's requirement for B_1 is markedly increased by repeated attacks of this disease.—R. ALLCROFT.

BIRCH, T. W. (1939). **The Requirements of the Dog and the Rat for Nicotinic Acid.** —*J. Nutrit.* **17.** 281–292. 3 figs. [Numerous refs.]

Experiments to determine the minimum daily requirements of the dog for nicotinic acid showed that, for complete protection against blacktongue and for rapid increase in body weight, about 1 mg. per day was necessary for an animal of 5–10 kg., *i.e.* is 0·25 mg. per kg. body weight. Lower values, 0·13 mg. per kg. gave complete protection against blacktongue and slight increase in weight, but 0·084 mg. and 0·027 mg. per kg. gave no protection. It is calculated that 1·0 mg. of nicotinic acid is contained in 4–10 g. of yeast.

Evidence is presented which indicates that nicotinic acid is not essential for the rat; complete deficiency of nicotinic acid in the diet of the rat for over 150 days was not accompanied by any specific physiological dysfunction, such as is observed in dogs, swine, or man.—R. A.

COLE, R. K. (1938). **Vitamin E and Avian Neurolymphomatosis.** — *Science.* **88.** 286–287. 1 table. [1 ref.]

C. has been unable to confirm the claim of BUTLER and WARREN [*V. B.* **8.** 642.] that neurolymphomatosis is curable by cold-pressed wheat germ oil. C. applied this therapy to 41 fowls showing symptoms of fowl paralysis. Ten received a total dose of 3–8 c.c. by intraperitoneal injections, 21 received 6–14 c.c. in the food, and ten were used as controls.

Most of these birds eventually died of fowl paralysis which was confirmed at autopsy in eight out of the ten injected and in 14 out of the 21 fed with the wheat-germ oil. Seven of the controls showed gross lesions of neurolymphomatosis.—J. E.

GANDALL, L. A., Jr., CHESLEY, F. F., GRAY. R. E., & ROBINSON, H. E. (1939). **The Effect of Chondroitin Sulfuric Acid on Gizzard Erosion and Growth in Chicks.** —*J. Nutrit.* **17.** 53–61. 3 tables. [5 refs.]

Statistical analyses were made of the results of adding chrondroitin sulphuric acid to various gizzard erosion producing diets fed to nearly 400 chicks. No definite protective action against gizzard erosion was demonstrated by either a commercial or purified form of chrondroitin sulphuric acid, but under certain conditions it appeared to have a slight favourable effect upon growth. It is suggested that any slight influence on gizzard erosion may be the result of a general nutrition improvement rather than the action of a specifically protective substance. A discussion is given of incidental observations on chicks receiving gizzard erosion producing diets. [See also *V. B.* **8.** 113, and **9.** 108].—R. ALLCROFT.

PUBLIC HEALTH

GRASSI, L. (1938). Produzione igienica del latte alimentare. **[Hygienic Milk Production]**.—*Rep. 13th int. vet. Congr. 1938.* **2.** 1125–1129. [In Italian: English, French and German summaries. Discussion pp. 1165–1166 in English and German].

G. discusses the production of milk that is safe for human consumption. He emphasizes the need for licence of producers and for an adequate veterinary service to deal with control and inspectorate functions.—E. MARTIN.

ROUX, L. (1939). Les étapes du contrôle du lait 1875–1939. Lacto-densimétre, analyse chimique, épreuve biologique. Rapport à la Société des Vétérinaires Vaudois le 18 juin 1939. **[Progress in Milk Control in Canton Vaud, Switzerland, 1875-1939]**.—*Schweiz. Arch. Tierheilk.* **81.** 328–333. [In French].

Federal laws governing the sale of foodstuffs have been in operation for the past 30 years, but in several cantons there was legislation before this time. Regulations dealing with animal disease in relation to milk are of comparatively recent introduction; the present order dating from 1936 lists as unwholesome milk from cows affected with any of the following diseases:– inflammation, tuberculosis and eczema of the udder; generalized TB.; brucellosis; gastro-enteritis; retention of the placenta with chronic metritis; febrile affections; specific diarrhoeas, and other serious digestive troubles. [It does not appear that the order prohibits the sale of milk from cows affected with the diseases mentioned.] The order also provides that milk from cows affected with foot and mouth disease and from cows with acute stages of contagious abortion must be heated to 85°C. before being sold to the consumer. Milk from tuberculin tested cows and pasteurized milk must conform to such stringent regulations that their production has made no progress. In the canton of Vaud it is stated that little progress has been made in the control of TB. and contagious abortion. —N. J. SCORGIE.

TROPA, E. A., & MARQUES ESTEVES, E. (1938). Sôbre a apreciação de leites crús pelos processos de Breed-Brew e de Skar. **[Examination of Raw Milk by the Breed-Brew and Skar Methods]**.—*Repos. Lab. Pat. vet., Lisboa.* **4.** 121–131. 1 table, 2 charts. [English and French summaries].

The authors examined over 100 samples of raw milk by the Skar and Breed-Brew methods. They conclude that neither process shows marked superiority over the other. They consider, however, that in dealing with milk of very high bacterial content the Skar method is superior to the Breed-Brew method since it permits figures to be given where the latter method produces the statement "innumerable". They also comment on the possibility of bacteria being removed in the fat solvent in the Breed process, but conclude that this aspect of the question has been exaggerated by some critics of the method.—MILLER WATSON.

TRAWINSKI, A. (1938). Ursachen, Erkennungsmethoden und Bedeutung für die Fleischbeurteilung bakterieller, parasitärer und physikalisch - chemischer Fleischveränderungen der Schlachttiere. **[Causes, Methods of Detection and Importance in Meat Inspection, of Bacterial, Parasitic, and Physico-Chemical Changes in the Flesh of Slaughter Animals]**.—*Rep. 13th int. vet. Congr. 1938.* **2.** 1113–1123. [In German: English, French and Italian summaries. Discussion pp. 1123–1124 in German and Italian]. [Author's English summary copied *verbatim*].

1. Bacterial and parasitical changes of flesh may be caused by microbes and parasites pathogenic for animals only or for both animals and man. Hence meat may be classed firstly as dangerous or not dangerous to human health and secondly as fit, unfit or conditionally fit for consumption.

2. The keeping quality of meat depends on the physico-chemical changes in the dead muscle. In special cases of meat inspection the determination of the pH enables one to notice the beginning of harmful processes going on in the muscular tissue and also the state in which the animal was slaughtered.

3. Serological investigations of meat extract of animals suffering from cysticercosis or trichinosis by means of the precipitation test yield good results even if the parasitic infestation is but slight and undetectable macroscopically.

VALENTI, E. (1938). I risultati dell'esame batteriologico delle carni nei riguardi della presenza dei germi, e delle loro alteraxioni fisico chimiche [organolettiche]. **[Results of Bacteriological Meat Inspection for Meat-Poisoning Bacteria].**—*Rep. 13th int. vet. Congr. 1938.* **2.** 1102–1112. [In Italian: English, French and German summaries. Discussion pp. 1123–1124 in German and Italian].

From June, 1932 to August, 1938, 750 samples of meat from the abattoir in Milan were examined at the municipal bacteriological laboratory. The samples were from carcasses which were under suspicion. Of these samples, 442 (60·5%) were sterile. Various bacteria were found in 288 (39·5%), mostly intestinal saprophytes. Bacteria of the paratyphoid group were present in five cases, *viz*, *Salmonella enteritidis* in three calves, two of which showed polyarthritic and liver lesions, and *S. typhimurium* in a foal affected with polyarthritis and in a heifer with interstitial hepatitis and chronic peritonitis.

Of 264 lymph nodes examined, 257 (97·5%) were infected, but of 156 meat samples taken from the same animals as the lymph nodes, only 58 were found infected.—E. MARTIN.

HAINES, R. B., & MORAN, T. (1940). **Porosity of, and Bacterial Invasion Through, the Shell of the Hen's Egg.**—*J. Hyg., Camb.* **40.** 453–461. 4 text figs., 4 figs. on 1 plate, 4 tables. [3 refs.]

By histological methods the authors demonstrated four layers in the intact shell of the hen's egg, namely, cuticle, spongy layer, mammillary layer, and inner shell membrane. Distinct channels or pores are present in the spongy layer, but these tend to disappear in the mammillary layer in which only a network of much finer channels can be observed. Experiments indicated that, under suction, bacteria and yeasts can readily be pulled through the shell apertures, and it seems *a priori* probable that such a suction is set up when a warm, newly-laid egg cools down and air is drawn in to form the air-space. In particular it might be expected that a moist film of bacteria present on the shell would thus be sucked into the egg. Experiments designed to test this possibility showed that total immersion of eggs in fluid containing bacteria at a lower temperature than the egg invariably led to a high percentage of rots, whereas when the fluid was at a higher temperature than, or the same temperature as, the eggs comparatively little rotting occurred. The importance of this finding with regard to the washing of eggs is pointed out.—N. J. S.

THERAPEUTICS

—. (1940). **Pharmaceutical Specialities. British Equivalents and Alternatives for Foreign Proprietary Products.** pp. 24. London: Association of British Chemical Manufacturers. 166, Piccadilly, London, W.1. [2nd Edit.] [8vo].

A useful list of about 200 products of British origin either identical with, or sufficiently similar in therapeutic properties as to be capable of replacing, special pharmaceuticals of foreign origin. In a few instances the substitute is imported from Imperial or neutral sources. The information is conveniently tabulated in five columns, the first giving the proprietary names of the foreign products, the second indicating the names of the British equivalents having the same essential composition, the third providing the names of the British makers or suppliers, the fourth giving the names of British products of similar therapeutic properties and the fifth providing the names of makers of these substitutes.

The publication can be obtained gratis, on application, and should prove of particular service to overseas medical and veterinary users of pharmaceutical specialities who may be unaware of the extent to which British makers can now meet their requirements.—H. H. G.

—. (1940). **The Use of Sulphonamide Compounds in Veterinary Practice. Discussion by the Central Veterinary Society.** [Speakers: KING, W. S., HIGNETT, S. L., REID, D. T., HARE, T., GREENFIELD, ARDLEY, D. G., & DAVIES, J. J.] —*Vet. Rec.* **52.** 455–463.

KING, in dealing with the mechanism of streptococcal pneumonias and septicaemias, considered that saturation therapy with the sulphonamide compounds would probably meet with the greatest degree of success if practised at an early stage of the disease. This had been his experience and apart from excellent results obtained in equine pneumonias, he had found that quittor, sinusitis, arthritis,

and infection of wounds yielded in a remarkable way to the specific treatment. HIGNETT surveyed the history of the compounds and briefly described their chemical composition, referring to the difficulties which exist owing to the large number of drugs of this group placed on the market by the various manufacturers. He believes that for veterinary purposes sulphanilamide is the most suitable of the various compounds. Horses, cattle, pigs, and dogs will tolerate large doses of sulphanilamide, and doses far in excess of those suggested for therapeutic purposes have not been attended by any fatal results. It was hoped that the sulphonamide drugs would prove a rational means of treating streptococcal mastitis, but experimental results have shown that although they are particularly valuable in the treatment of acute generalized infections such as equine pneumonia, they are only of limited value in the treatment of localized streptococcal conditions, such as mastitis; sulphanilamide is of no value in the treatment of mastitis due to staphylococci or *Corynebacterium pyogenes*. REID had had disappointing results in the sulphonamide treatment of mastitis, but believed that the drugs of this group were of definite use in the treatment of white scour in calves. HARE outlined briefly the pathogenesis of β-haemolytic streptococcus infections in dogs, horses, cats, pigs and cattle, showing that in only a small proportion of clinical cases did the organisms remain in the blood stream. Sulphonamide in the blood interfered with the growth of the organisms, but did not destroy them. Where streptococcal infection resulted in the formation of pus, sulphonamide therapy was no substitute for surgical treatment. GREENFIELD and DAVIES each described cases of successful treatment of canine conditions.
—J. R. LAWSON.

GILDOW, E. M., FOURT, D. L., & SHAW, A. O. (1938). **Sulphanilamide in the Treatment of Streptococcic Mastitis.**—*J. Dairy Sci.* **21.** 759–766. 2 figs. [9 refs.]

A level of about 2 mg. % of free sulphanilamide was maintained for a period of 12 hours in the milk and blood of cows after an initial dose of 5 g. sulphanilamide per 100 lb. body weight. This ensured a reasonably constant level of sulphanilamide in the blood of cows that were dosed twice daily at 12-hour intervals. When larger doses (10–15 g.) were given a level of 8 mg. % was obtained in the blood, but symptoms of sulphanilamide poisoning were evident before this level was obtained, although cows varied in their tolerance of the drug. Varying doses of up to 15 g. failed permanently to eliminate β-haemolytic streptococci from the udder, regardless of the type of case. Symptoms of acute mastitis were relieved in most cases with doses of 5–10 g. per 100 lb. body weight given over a period of 7–12 days. 5 g. per 100 lb. body weight given daily in three equal doses over a period of 12 days had little or no detrimental effect in 9 of 11 cases treated.—R. FISHER.

LOEWENTHAL, H. (1939). **Combined Serum and Sulphanilamide in the Treatment of Streptococcal Infections in Mice.**—*Lancet.* **236.** 197–199. 3 tables. [18 refs.] [Author's summary copied *verbatim*].

A single dose of sulphanilamide administered at the time of infection with haemolytic streptococci will protect only a minority of normal mice; whereas it protects the majority of animals which have received, 16–18 hours before infection, a dose of antiserum incapable by itself of preventing death.

Mice infected with haemolytic streptococci can be effectively treated with a combination of sulphanilamide and antiserum even if this treatment is begun as long as 18 hours after infection, when the animals are already severely ill. Since neither sulphanilamide nor antiserum alone can achieve this result it appears that these two therapeutic agents act in a different but complementary manner.

LOCKWOOD, J. S., & LYNCH, Helen M. (1936). **Studies on the Mechanism of the Action of Sulphanilamide. III. The Effect of Sulfanilamide in Serum and Blood on Hemolytic Streptococci in Vitro.**—*J. Immunol.* **35.** 155–190. 16 text-figs., 2 plates, 1 table. [Numerous refs.] [Authors' summary copied *verbatim*].

1. Experimental studies of the phagocytic and bactericidal actions of blood and serum should be so performed as to exclude the presence of even traces of added peptone-like material.

2. When traces of peptone are present, sulfanilamide in concentrations similar to those occurring in the sera of treated patients produces morphological alterations of hemolytic streptococci in serum which are associated with diminished reproductive activity but not with bacterial death. In this form the streptococci are susceptible to destruction by phagocytes,

Blood containing peptone and sulfamilamide may, therefore, be bactericidal.

3. When peptone is excluded by washing the inoculum in serum or saline, sulfanilamide in the above concentrations will completely inhibit multiplication of young streptococci in serum, and sterility will frequently result within 24 hours if the inoculum is less than 5000 chains per cubic centimeter. Smears of the serum after sterilization has occurred suggest that lysis of the majority of the inoculated organisms has taken place.

4. The population curve in any medium is a resultant of the combined activities of peptone and sulfanilamide, with these two reagents exercising opposing effects. A direct neutralization effect between these two substances has not been demonstrated.

5. It is suggested that sulfanilamide prevents the specialized metabolic activity required of invasive organisms. The evidence so far obtained indicates that this effect may be achieved through prevention of the utilization of the protein substrate by the organisms.

WELD, Julia T., & MITCHELL, Lucy C. (1939). **Studies on the Mode of Action of Sulfanilamide in vitro.**—*J. Bact.* **38.** 335–350. 6 figs. [3 refs.]

The effect of sulphanilamide on the growth of streptococci in rabbit serum was investigated. Sulphanilamide in moderate concentrations is bactericidal only for streptococci which are multiplying relatively slowly. The bactericidal action of the drug appears to be increased when the organisms are grown at elevated temperatures. The experiments do not support the theory that sulphanilamide interferes with the power of streptococci to utilize serum proteins or that peptone *per se* interferes specifically with the bactericidal effectiveness of sulphanilamide.—J. M. ROBSON.

JAMES, G. V. (1939). **The Effect of Administration of an Acetate on Detoxication and Therapeutic Activity of Sulphanilamide.**—*Biochem. J.* **33.** 1688–1693. 1 fig., 5 tables. [15 refs.]

Mice receiving sodium acetate together with sulphanilamide, excreted more acetylsulphanilamide than mice receiving the same dose of sulphanilamide. Such combined treatment did not diminish the curative value of the drug against infections with streptococci, but was effective in reducing the toxic symptoms resulting from the administration of a single dose of sulphanilamide. When smaller doses of sulphanilamide were given over a longer period, acetate did not appreciably affect the results. —J. M. ROBSON.

SELBIE, F. R. (1940). **The Inhibition of the Action of Sulphanilamide in Mice by *p*-Aminobenzoic Acid.**—*Brit. J. exp. Path.* **21.** 90–93. 4 tables. [7 refs.]

The therapeutic action of sulphanilamide in mice infected with streptococci can be inhibited by *p*-aminobenzoic acid in the same way as its anti-streptococcal action is inhibited in bacterial cultures. The mechanism of its action *in vivo* would therefore appear to be similar to its action *in vitro*.—J. M. ROBSON.

MACDONALD, A. (1940). **Sulphamethylthiazole in Experimental Staphylococcal Infections.**—*Lancet.* **238.** 1157–1159. 4 tables. [8 refs.] [Author's summary copied *verbatim*].

About half the number of mice infected with staphylococci by the intraperitoneal and intravenous routes survived twenty-one days when treated for fifteen days with sulphamethylthiazole. Sulphapyridine under similar conditions was only slightly less effective. Many of the treated mice still harboured *S. aureus* in the kidneys or the other organs after twenty-one days.

Neither sulphamethylthiazole nor sulphapyridine given by mouth affected the course of experimental staphylococcal lesions of the skin of mice.

LONG, P. H. (1940). **The Mode of Action of Sulfanilamide and Its Derivatives.**—*Chemistry and Medicine.* pp. 185–211. 7 tables. [Numerous refs.] Minneapolis: University Minnesota Press. [Author's summary copied *verbatim*].

It seems quite probable from the evidence now available that the chemotherapeutic activity of Prontosil and Neoprontosil in streptococcal infections is the result of their breakdown to sulfanilamide in the tissues of the infected host.

Sulfanilamide and sulfapyridine act as bacteriostatic and, under certain conditions, as bactericidal agents against susceptible bacteria. They also seem to have the power of inactivating certain bacterial toxins.

The mechanism by which these drugs produce bacteriostasis and inactivation of toxins remains unknown despite several attempts to explain it.

The importance of the response of the host to an infection which is treated by chemotherapy should be recognized if a complete

picture of the mode of action of these drugs is to be acquired.

CORPER, H. J., COHN, M. L., & BOWER, C. (1939). **Sulfanilamide in Tuberculosis. An Explanation of Certain Findings.**—*Amer. Rev. Tuberc.* **40.** 452–466. 3 figs., 2 tables, 1 chart. [13 refs.]

The authors stress the obscurity which surrounds the value of sulphanilamide in the treatment of TB. and the impossibility of regarding the subject as yet with any finality. In view of the conflicting results obtained by various workers it is suggested that the difference in dosage could not be the only deciding factor, and the investigations reported in this paper were based on this idea. It was found that administration of large doses of sulphanilamide over long periods of time begun before, or concurrently with, infection of g. pigs with bacilli of the human type, had an apparent though not real retarding effect on the course of the infection, especially in the spleen. This is explained as an organic toxic effect of the sulphanilamide. This conclusion is based on an experiment in which the effect on the spleen of large doses of sulphanilamide *per os* was studied in normal g. pigs given intravenous injections of large amounts of heat-killed, and of viable avirulent human tubercle bacilli. These produced no TB. but caused a transient marked splenomegaly which gradually subsided within 6–9 months after injection. A similar effect of sulphanilamide in man has been recorded. The drug was found to have no appreciable effect on the spread of TB. in g. pigs, and it is suggested that any effect which occurs is due to the toxic effect of the compound and is not a real retardation of the infection.

KOLMER, J. A., & RULE, Anna M. (1940). **The Therapeutic Activity of Sulfanilamide and Allied Compounds in Experimental Brucellosis of Mice.**—*J. Pharmacol.* **68.** 406–412. 7 tables. [12 refs.]

Five sulphonamide compounds used in the treatment of acute brucellosis of mice showed best therapeutic results in animals infected with *Br. abortus*, and were much less effective in mice infected with *Br. melitensis*. All the drugs appreciably prolonged the lives of the mice infected with *Br. suis*, but failed to prevent death. In *Br. abortus* infections the best results were obtained with aldanil, in *Br. melitensis* infections with sulphapyridine, and in *Br. suis* infections with sulphanilamide and sulphapyridine.—J. M. ROBSON.

MCLEOD, M. (1938). **The Use of Compounds Related to *p*-Aminobenzesulphonamide in the Treatment of Certain Infections in Mice.**—*Biochem. J.* **32.** 1770–1774. 2 tables. [6 refs.] [Author's summary copied *verbatim*].

1. Ten compounds have been tested in respect of their chemotherapeutic actions on mice infected with haemolytic streptococci, pneumococci, staphylococci or *Bacillus aertrycke*. The antibacterial actions *in vitro* of these compounds have also been examined.

2. 3-Nitro-4-hydroxybenzenesulphonamide has a marked curative effect on streptococcal septicaemias in mice. The low toxicity of this compound suggests that it should be investigated on a wider scale.

3. Diacetyldiaminodiphenylsulphide delays the death of mice infected with staphylococci.

4. Under the conditions of experimentation, no correlation could be established between the action of these compounds *in vitro* and their chemotherapeutic activity on infected mice. This result is in accordance with the view that the important action of these compounds on the organisms is not one of gross toxicity, but that it involves a damaging of the defences which normally protect the organisms from the bactericidal processes of the body.

FILDES, P. (1940). **A Rational Approach to Research in Chemotherapy.**—*Lancet.* **238.** 955–957. [16 refs.]

An " essential metabolite " is a substance or chemical group which takes an essential part in a chain of syntheses necessary for bacterial growth. Antibacterial substances function by " interfering " with an essential metabolite and thus inhibit growth. The interference may be (1) by oxidizing a substance which requires to be reduced, (2) by molecular combination forming an inactive product, or (3) by competition for an enzyme associated with the essential metabolite. It is claimed that sulphanilamide acts as in (3), the essential metabolite being *p*-aminobenzoic acid. Class (3) inhibitions require an inhibitor so closely related chemically to the essential metabolite that it can fit the same enzyme, and sufficiently unrelated to be devoid of essential metabolic activity. It is suggested that research in chemotherapy might reasonably be directed to making such modifications of known essential metabolites as will have those characters.—J. M. ROBSON.

I. Welch, H., & Hunter, A. C. (1940). **Method for Determining the Effect of Chemical Antisepsis on Phagocytosis.**—*Amer. J. publ. Hlth.* **30.** 129–137. 2 figs., 3 tables. [7 refs.]

II. Welch, H. (1939). **Mechanism of the Toxic Action of Germicides on Whole Blood Measured by the Loss of Phagocytic Activity of Leucocytes.**—*J. Immunol.* **37.** 525–533. 2 tables. [7 refs.]

III. Welch, H., Brewer, C. M., & Hunter, A. C. (1940). **Toxicity of Antiseptics. Experiments with Hemolytic Complement.**—*Ibid.* **38.** 273–282. 3 tables. [4 refs.]

I. The method depends on the ability of the normal g. pig or human leucocyte to engulf artificially opsonized staphylococci in the presence of increasing concentrations of the germicidal substance under test. All tests take place in the presence of 40 % fresh g. pig blood. This gives the toxicity of the antiseptic. The germicidal action of the antiseptic is then determined on staphylococci and from the two figures a " toxicity index " is calculated. The " toxicity indices " were determined for iodine, metaphen, hexylresorcinol, potassium mercuric iodide, mercuric chloride, phenol, merthiolate and mercurochrome. The results obtained were found to agree closely with those computed by Salle [*V. B.* **8.** 465.], whose method is based on a comparison of the killing power of the antiseptic for bacteria with its toxic action toward living embryonic tissue.

II. The thermolabile complement in g. pig blood which accelerates phagocytosis plays an essential part in the proposed method, described by Welch and Hunter [see I] for determining the toxicity of germicides. The function of g. pig leucocytes in phagocytosing staphylococci is usually destroyed with smaller concentrations of germicide than is the function of human leucocytes. The thermostable opsonin appears to be responsible for the greater resistance of human blood to the action of germicides. The normal variation in the opsonic activity of g. pig complement has no effect on the " toxic endpoint " of a germicide when tested by the proposed method. The toxic effect of germicides appears to be directed against the humoral in contrast to the cellular elements of the blood.

III. Previous work [see II] has suggested that the toxic effect of germicides, when tested on blood as a tissue, is directed against the humoral and not the cellular elements. The present work has not been successful in simplifying the procedure for determining the relative toxicity of germicides by the use of haemolytic complement. By the use of certain germicidal solutions it is possible to separate haemolytic complement from those components of plasma which bring about rapid phagocytosis. The finding of Ward and Enders (1933), that human complement cannot increase the absolute capacity of a serum to promote phagocytosis, has been confirmed.—J. M. Robson.

Findlay, G. M., Mackenzie, R. D., & MacCallum, F. O. (1940). **Chemotherapeutic Experiments on Pleuro-Pneumonia-Like Organisms in Rodents.**—*Brit. J. exp. Path.* **21.** 13–22. 9 tables. [9 refs.]

Sulphanilamide, sulphapyridine, sodium salicylate, and lithium antimonyl tartrate were without action on pleuropneumonia-like organisms isolated from rodents. Neoarsphenamine had a slight action in preventing arthritis in mice injected with organism L 7, and in preventing the development of encephalitic symptoms in mice following intracerebral injection of L 5 and L 6. Organic gold preparations were highly active in preventing arthritis in rats and mice and encephalitis in mice due to L 4, L 5, L 6, and L 7. Organic gold preparations are bactericidal to pleuropneumonia-like organisms both *in vitro* and *in vivo*.—J. M. Robson.

Seery, T. M., & Bieter, R. N. (1940). **A Contribution to the Pharmacology of Berberine.**—*J. Pharmacol.* **69.** 64–67. 2 tables. [9 refs.]

Berberine having been recommended in the treatment of oriental sore it was decided to test its action on *Trypanosoma equiperdum* infection. Given orally the drug has no value, but infected rats inoculated subcutaneously or intraperitoneally with berberine lived longer than controls.—U. F. Richardson.

POISONS AND POISONING

Bardelli, P., & Menzani, C. (1938). La fluorosi. [**Fluorosis**].—*Atti Ist. veneto.* **97.** 591–674. 43 figs., 6 tables. [Numerous refs.]

A survey is given of the observations and research relating to mass fluorine poisoning of industrial origin. In 1929 a large aluminium-producing plant was established in a valley of

the province of Veneto. Shortly afterwards bovines and caprines of the region developed lameness in increasing numbers. Changes were also noted in the vegetation of the area. Chemical analysis showed that grass contained 4–6 times more F than grass from other areas. After varying periods bovines and caprines fed on such fodder developed fluorosis. The clinical picture and macroscopic and microscopic findings are described, together with the chemical investigation which was carried out. —E. MARTIN.

FORBES, J. C., NEALE, R. C., & SCHERER, J. H. (1936). **A Liver Preparation Protecting against Necrosis from Chloroform or Carbon Tetrachloride Administration.**—*J. Pharmacol.* **58.** 402–408. 4 figs. [7 refs.] [Authors' summary copied *verbatim*].

The preparation of a liver concentrate which when injected into rats, protects them to a marked extent against carbon tetrachloride and chloroform poisoning, is reported. The active principle is not choline, glucose or the pernicious anemia factor.

WAUD, R. A. (1940). **The Action of Kalmia Angustifolia (Lambkill).**—*J. Pharmacol.* **69.** 103–111. 3 figs. [8 refs.] [Author's summary copied *verbatim*].

The effect of *Kalmia angustifolia* (lambkill) were studied on various animals and isolated tissues. Intact animals showed drowsiness, defecation, salivation, nausea and vomiting, tearing, dyspnoea, blindness, tremors, convulsions and death.

The rabbit's uterus and intestine and the guinea pig's lung were stimulated while the rat's uterus and the frog's heart were inhibited.

There was no constant relation between the action of the drug and the autonomic system. It appears to have a specific effect which shows only a superficial resemblance to the more common drugs having a similar action. [This plant is poisonous to sheep (see *V. B.* **1.** 70.)]

CRAIG, J. F., & DAVIES, G. O. (1940). **Some Observations on Bracken Poisoning.**—*Vet. Rec.* **52.** 499. [2 refs.]

The authors record an outbreak of bracken poisoning in calves which were bedded down with bracken. Deaths commenced in October and P.M. examination revealed changes similar to those reported by previous authors. Haemorrhages were observed in the lungs, on the pleura and other serous surfaces, on the bicuspid and tricuspid heart valves, and on the mucous membrane of the alimentary tract and bladder. The lesions are described. No organisms were found on bacteriological examination. The authors suggest that on the evidence available, advice on the use of bracken for litter or silage should be guarded.—R. F.

TECHNIQUE AND APPARATUS

HUNTER, C. A., & CRECELIUS, H. G. (1938). **Hydrogen Sulphide Studies. I. Detection of Hydrogen Sulphide in Cultures.**—*J. Bact.* **35.** 185–196. 2 figs., 2 tables. [18 refs.] [Authors' summary copied *verbatim*].

1. Experiments to determine the sensitivity of ferric ammonium citrate and bismuth liquor for detecting hydrogen sulphide definitely show the superiority of bismuth over iron irrespective of the pH. The most sensitive range of iron is an alkaline menstrum while with bismuth the H-ion concentration has no effect.

2. After experimenting with more than 650 media, incorporating a soluble form of bismuth, 0·5 per cent bismuth liquor or 16 mgm. bismuth and ammonium citrate, Merck, U. S. P. IX, several formulae were developed which give good results. The variable factor is the tryptone, not all lots being of uniform composition. In case precipitation occurs with certain lots of tryptone the addition of 5 per cent of skim milk overcomes this difficulty.

3. The bismuth sulphite medium is far superior to any medium incorporating lead or iron for the detection of hydrogen sulphide in cultures. The results show that organisms producing a small quantity of hydrogen sulphide give negative results with iron while in the bismuth sulphite medium definite browning occurs.

4. Organisms which are usually stated in the literature to be negative hydrogen sulphide formers such as *Salmonella paratyphi* and *Shigella dysenteriae*, give positive reactions with bismuth.

5. It is recommended that the indicator and method be stated when recording whether an organism does or does not form hydrogen sulphide. It is not sufficient to state that the

organism is a negative or positive hydrogen sulphide producer.

GILLESPIE, R. W. H., & RETTGER, L. F. (1938). **Bacterial Oxidation-Reduction Studies. I. Differentiation of Species of the Spore-Forming Anaerobes by Potentiometric Technique.**—*J. Bact.* **36.** 605–620. 3 graphs. [Numerous refs.] [Authors' summary copied *verbatim*].

Evidence has been presented that *Clostridium botulinum* and *Clostridium tetani* establish final potentials (in about 2 or 3 days at 37°C.) at significantly different levels of reducing intensity, levels which may be considered as characteristic of the species.

SHER, B. C., & SWEANY, H. C. (1939). **Chemical Factors Influencing the Growth of Tubercle Bacilli. I. Metal Catalysts.**—*J. Bact.* **37.** 377–387. 4 tables. [5 refs.]

The effect upon the growth of a human strain of tubercule bacillus (H.37) of the addition of various ions to LONG and SEIBERT'S synthetic medium (minus the ferric ammonium citrate) was studied. When the chemicals used were recrystallized and thoroughly purified the growth was less than half that obtained with chemicals of C.P. [chemically pure] quality. The addition of Fe salts only slightly stimulated growth; Cu, Mn and pyroantimonate ions were without pronounced effect, but a combination of Fe salts and non-ferrous catalysts resulted in two-fold enhancement of growth. More than 1 : 3,000 parts of $CuSO_4$ prevented growth but K pyroantimonate and $MnSO_4$ yielded earlier and more abundant growth. Diphenylamine inhibited growth in concentrations above 1 : 20,000 in all media used. The pH of the substrates of the cultures and the early appearance of growth were controlled by the nature of the medium employed and by the growth history of the inoculating culture.

—ALFRED EDEN.

KEMPNER, W. (1939). **Oxygen Tension and the Tubercle Bacillus.**—*Amer. Rev. Tuberc.* **40.** 157–168. 1 fig., 2 tables, 1 chart. [Numerous refs.]

The respiratory metabolism of cultures (15–20 days old) of tubercle bacilli was measured in a Warburg manometer. The bacilli were suspended in m/50 phosphate (pH 7·4)–m/80 glycerin solution and they were subjected to 14 different oxygen concentrations varying from 0·1–100 vols. % of one atmosphere. The maximum respiratory rate was attained at concentrations between 12 and 14 vols. % of one atmosphere. A definite inhibition of 20·4% occurred at 8 vols. %. At 5 vols. % oxygen the inhibition was 28% and at 1·1 vol. % it was 70%. This inhibitory influence of low oxygen concentrations on the respiration of the bacilli causes a diminution in their chemical reactions and a decrease in their injurious effects.—E. C. H.

DIXON, A. C. (1940). **The Preparation of Smears from Tuberculous Sputum.**—*Vet. Rec.* **52.** 513.

In the clinical examination for tuberculosis, the sputum voided by suspect cows is frequently found only as dry flakes stuck on the wall of the cow shed. The flakes are collected into tubes containing lime water which dissolves the mucus present: after straining through fine gauze the sample is centrifuged and the smear made from the deposit in the usual manner.—J. R. LAWSON.

HOLWECK, F. (1938). Mesure des dimensions élémentaires des virus par la méthode d'ultramicrométrie statistique. **[Measurement of Viruses by the Method of Statistical Ultramicrometry].**—*C. R. Acad. Sci., Paris.* **207.** 380–382. [3 refs.]

The minimum infective (critical) dose of vaccinia having been determined, increasing ten-fold concentrations of the virus were irradiated with X-rays under standard conditions until the amount of virus was reduced to the critical dose. A mortality curve was constructed from which the size of the particle was determined by means of a suitable formula.

The infective element in these experiments measured about 85 mμ. This figure is smaller than that obtained by ultrafiltration, centrifugation or ultra-violet micrography (120 mμ).

—R. E. GLOVER.

MCINTOSH, J., & SELBIE, F. R. (1940). **The Application of the Sharples Centrifuge to the Study of Viruses.**—*Brit. J. exp. Path.* **21.** 153–160. 1 fig., 1 table. [8 refs.] [Authors' summary copied *verbatim*].

Several modifications are described by which the Sharples laboratory centrifuge has been adapted for the efficient sedimentation and concentration of virus or bacteriophage from large quantities of suspension.

Preliminary results show that concentrate of high purity can be obtained by this method without loss of activity.

VAN ROOYEN, C. E. (1938). **The Micromanipulation and Microdissection of the Molluscum Contagiosum Inclusion Body.**—*J. Path. Bact.* **46.** 425–436. 18 figs. on 5 plates. [Numerous refs.] [Author's summary copied *verbatim*].

1. Fresh material obtained from ten cases of human molluscum contagiosum has been stained *intra vitam* with brilliant cresyl blue and subjected to microdissection.

2. The molluscum inclusion body has been successfully removed from the infected epithelial cell. It has also been replaced in the same cell without injuring the latter.

3. The removal of the molluscum body leaves a large cavity in the cell. The cytoplasm does not flow into this space, the cavity being apparently lined by a localized condensed layer of cytoplasm.

4. The boundaries of this cavity have been defined by injecting indian ink into it or alternatively by introducing indian ink into the surrounding cytoplasm.

5. About one hundred molluscum bodies from the smallest to the largest have been removed from the containing epithelial cells by microdissection and in no case was there any evidence of attachment between body and cytoplasm.

6. The molluscum body probably grows from a more minute form of the virus. It is not formed by desiccation nor by fusion of any intracytoplasmic constituents of the cell.

7. It is suggested that the large oval or pear-shaped forms of the molluscum body represent a later stage of development than the smaller spherical ones.

8. The large pear-shaped inclusions have been shown to possess a definite outer membrane which is thinnest at the conical pole. These observations have been established by demonstrating the tensile strength of the membrane on " palpation " with the point of a micro-needle. The weakness of the conical segment has also been revealed by transfixing the inclusion body between two needles and exerting traction on its walls.

9. The elementary virus bodies contained within the molluscum inclusion body have been shown to be supported in a gelatinous mucoid substance.

GUILLOT, G., & CAUDRON, M. (1939). La réaction de Fulton et la réaction au carmin (Chorine). **[Fulton's and Chorine's Reactions].**—*Rev. vét. milit.* **23.** 149–164. [Numerous refs.]

There is a discussion of the literature on Fulton's test and the authors state that at the Military Laboratory where the reaction was studied in over 2,000 instances, it was found to be invaluable for the detection of equine infectious anaemia. They suggest that it is analogous to the reaction devised by CHORINE which is used in human medicine in the diagnosis of malaria. The techniques of both reactions are given in detail. Comparative tests, using both Fulton's and Chorine's reactions were carried out on 115 samples of serum from healthy, from suspected, and from known anaemic horses, and the results contrasted. The influence was studied of such factors as antiseptics, time of obtaining the serum, length of time of keeping the serum, the clot, heat, and CO_2 on Fulton's reaction. [FULTON'S reaction depends upon the formation of a precipitate when serum from infected horses is added to very dilute solutions of mercuric chloride in double distilled water; the dilutions range from 1 : 30,000–1 : 100,000. Serum from healthy horses will give a precipitate in a 1 : 20,000 solution of mercuric chloride but seldom in weaker solutions.

For the test a series of five tubes are prepared containing 2 c.c. of mercuric chloride solution in dilutions of 1 : 30,000, 1 : 50,000, 1 : 60,000, 1 : 80,000, and 1 : 100,000. Two drops of serum are added and the tube shaken immediately. The tubes are examined after a few minutes and again after 24 hours. A positive reaction is indicated first by an opalescence and after 24 hours by a precipitate. To obtain good results the blood must stand at room temperature until the clot is formed and after separating the serum should be kept for 18 hours before testing.—Ed.]—J. R. LAWSON.

ANON. (1940). **Electrical Changes in Cerebral Damage.**—*Lancet.* **239.** 458–459. [5 refs.]

A brief description of the use of the electroencephalograph is given. It records the minute alterations in electrical potential caused by the metabolism of cerebral cells; normal cortical cells show a rhythmic change in electrical potential with a frequency of 8–12 a second. Associated with these well-marked frequencies are many underlying waves of lower voltage and varying rate, some occurring about 20 times a second while others have a duration of 2–3 seconds. These slow waves are normally absent, but in any condition affecting the normal behaviour of cerebral cells, their size increases and they may submerge the faster waves.

These abnormal waves are seen around areas of cortical damage and can be used to locate such diverse lesions as tumours, abscesses, and haematomas.

It has recently been confirmed that the type and amount of these slow waves are the best single measure of the severity of cortical damage.—R. ALLCROFT.

KNISLEY, M. H. (1938). **An Improved Fused Quartz Living Tissue Illuminator.**—*Anat. Rec.* **71.** 503–508.

The fused quartz rod method of illuminating living tissues depends on two principles :– first, the conduction of light to the tissue through a fused quartz rod so shaped that it exerts little pressure on the organs between which it passes and no tension or pressure on the structures to be examined, and second, the maintenance of the normal temperature of the illuminated area by continuously removing, as fast as it is produced, the heat developed there by transformation of light energy. The described improvement consists in providing the illuminating rod with a hollow tip through which both light and the temperature regulating solution are delivered to the tissue ; fused to the rod is a side tube through which a continuous flow of the solution can pass. By means of this method many of the internal organs of small living animals can be studied with the microscope while they are in their normal positions and with their blood vessels, nerves and attachments intact.—R. ALLCROFT.

PHYSIOLOGY

JOHNSON, S. R. (1939). **The Level of Inorganic Phosphorus in the Blood of Dairy Cattle.**—*J. Nutrit.* **17.** 15–21. 2 tables. [8 refs.]

Whole blood inorganic P figures are given for 111 normal cows from two years to over six years of age, and for 101 calves and heifers ranging from 1–30 months of age. The average figure for the cows was 4·29 mg. per 100 c.c. whole blood. Lactation, breed of cow, and type of roughage consumed had no effect on the inorganic P level. Averages for five age groups of calves and heifers are given showing that the inorganic P of the blood of immature cattle diminished with increase in age in an approximately regular manner.—R. ALLCROFT.

SAMPSON, J., & BOLEY, L. E. (1940). **The Ketone Bodies, Sugar, and Calcium of the Blood of Ewes during Late Pregnancy.**—*Cornell Vet.* **30.** 392–401. 2 tables. [16 refs.]

Data are given for the total ketone bodies, sugar, and Ca of the blood of ewes in late pregnancy. Forty-five ewes had ketone figures of less than 3 mg. %, 9 varied from 3–6 mg. %, and 6 ranged from 6–10·5 mg. %. The average sugar values on 56 ewes varied from 26–65·5 mg. %, average 41, while the Ca values of the sera of 54 ewes ranged from 8–12·5 mg. %, average 10·75. The effects of underfeeding upon subclinical and clinical pregnancy ketosis are discussed and the association of these factors to the birth of weak lambs is considered. Statistical analysis of the ketone data shows that those ewes bearing twin lambs had higher ketone figures and slightly lower sugar values than those bearing singles, with no apparent correlation to the Ca values. The significance of these findings in connexion with the development of clinical pregnancy ketosis is discussed. —ALFRED EDEN.

PARKES, A. S., & HAMMOND, J. (1940). **Induction of Fertility by the Injection of Gonadotrophic Preparations.**—*Proc. R. Soc. Med.* **33.** 483–486. [Reprinted in *Vet. Rec.* **52.** 540–543 (1940)].

P. discusses briefly the general biological aspect of increasing fertility in sheep by the injection of gonadotrophic preparations. Injection of extract obtained from anterior lobe of horse pituitary into ewes during anoestrus caused ovulation (1–3 ova) not accompanied by full oestrus [see also ANDERSON (*V. B.* **10.** 215.)], and P. states that it was usually necessary to give a second injection after an interval of 16–17 days before the ewe would take the ram. In an experimental flock, seven ewes were thus induced to take the ram out of season, and of these four ultimately produced seven lambs. Other experiments showed that treatment of sheep during the last three or four days of a normal oestrous cycle caused super-ovulation at the next oestrus. Injection at any other time of the cycle or during pregnancy merely caused enlargement of follicles without ovulation.

H. discusses the possible applications of hormone treatment to the practice of sheep production. He gives these as follows :– (a) to reinforce oestrus in ewe lambs, breeding during their first year ; (b) to increase the

fertility of normal matings; (c) to breed from barren and lost-lamb ewes during the non-breeding season; (d) to obtain two crops of lambs in one year, and (e) to speed up ewes coming to the ram at the beginning of the breeding season.

It appears that the amount of horse pituitary extract used by the authors in their work was 50 mg.—N. J. Scorgie.

Greene, R. R., Burrill, M. W., & Ivy, A. C. (1938). **Experimental Intersexuality: The Production of Feminized Male Rats by Antenatal Treatment with Estrogens.**—*Science.* **88.** 130–131.

Pregnant rats injected with 2·0–4·0 mg. of oestradiol dipropionate gave birth to some males with definite female structures (vagina and nipples). In the feminized males the seminal vesicles and epididymides exhibited some inhibition or departure from normal development; in some of them the prostatic diverticula were entirely absent. From the few animals observed (14) it seems that the degree of development of female structures and inhibition of male structures has a fairly definite relationship to the dosage of oestrogen given.—R. A.

Korenchevsky, V., & Hall, K. (1940). **Pathological Changes in the Sex Organs after Prolonged Administration of Sex Hormones to Female Rats.**—*J. Path. Bact.* **50.** 295–315. 27 figs. on 5 plates, 2 tables. [Numerous refs.]

The co-operative activity of male hormones with oestrogens in female rats can produce both beneficial and pathological effects. The beneficial effect (observed in spayed rats) included development of a larger uterus with a more normal myometrium and a larger vagina. The most important pathological effects were severe metaplasia of the uterine epithelium, adenoma-like overgrowth of the uterine glands, cystic glandular hyperplasia in the uterine mucosa, and the formation of cysts, sometimes very large, in the ovaries. Male hormone exerts at first a follicle-stimulating action on the ovaries, then a luteinizing action; the gonadotrophic action then collapses and is replaced by a toxic action on the ovaries. Progesterone has no pathological action on the female organism and can prevent severe metaplasia of the uterine epithelium.—J. M. R.

Collip, J. B., Selye, H., & Thomson, D. L. (1940). **The Antihormones.**—*Biol. Rev.* **15.** 1–34. [Numerous refs.] [Abst. from authors' summary].

The history of antihormones is reviewed and the antigonadotrophic and antithyrotrophic hormones are discussed in detail. The possible existence of other antihormones, especially of antigrowth hormone, antiprolactin, antiketogenic, anticortin, antithyroid hormone, etc., is discussed.

The blood of animals chronically treated with gonadotrophic or thyrotrophic preparations acquires the ability to neutralize the action of such preparations in other animals. The antihormones are specific in so far as, for instance, antigonadotrophic hormone does not antagonize the action of the thyrotrophic hormone and vice versa. The blood of an animal rendered immune to a certain type of a gonadotrophic preparation, though very active in neutralizing the action of this preparation, may be relatively inactive with regard to other gonadotrophic extracts. Similar examples of extract specificity have been observed concerning the antithyrotrophic hormone. Neither the presence of the effector organ (the gonads in the case of the gonadotrophic and the thyroid in the case of the thyrotrophic hormone) nor that of the hypophysis is essential for antihormone formation. There is little or no evidence that chemically pure hormone preparations such as the oestrogens, adrenalin, etc., may form antihormones in the true sense of the word, although the sensitivity of the organism to such preparations may decrease after prolonged treatment.

Pretreatment with certain hormones will cause the appearance in the blood of principles antagonistic to these hormones. It is felt that the much-debated question, whether these principles are hormones or antibodies, cannot be answered with certainty as yet.

Jaques, L. B., & Mustard, R. A. (1940). **Some Factors Influencing the Anticoagulant Action of Heparin.**—*Biochem. J.* **34.** 153–158. 2 figs., 1 table. [14 refs.]

Whilst it is generally assumed that the anticoagulant action of heparin is due to direct combination with prothrombin, thrombin, or kinase, the present paper deals only with its antithrombin action.

Three methods of measuring the activity of the heparin were used, *viz*, (1) determination of clotting time, (2) determination of the dilution necessary to give a fixed clotting time, and (3) determination of the rate of clotting by measurements of turbidity, viscosity, or fibrin

nitrogen. The results showed that prolonged dialysis of plasma had little effect on the activity of heparin and that addition of sodium chloride to this plasma decreased the activity of the heparin. It is confirmed that heparin is active only in the presence of a protein in plasma; the protein is found in the albumin fraction, but is not crystalline serum albumin.

The experiments appear to confirm many of the conclusions reached by earlier workers (*e.g.* QUICK, HOWELL and FISCHER) and the authors consider that heparin acts by combining with and increasing the activity of antithrombin.

—H. V. HUGHES.

DOWNEY, H. (1938). **Handbook of Haematology. 4 Volumes.** pp. xxxii+3136. Numerous figs. [Numerous refs.] New York: Paul B. Hoeber. [fcp].

This handbook should be known to all engaged in pathological and physiological work. The subject is dealt with from the comparative zoological aspect and there is much that specially concerns domestic animals. The four volumes are divided into 44 sections, to each of which is appended an extensive bibliography. The different aspects of the subject are dealt with in great detail, *e.g.*, 159 pages are devoted to the erythrocytes, 165 pages to comparative haematology, 300 pages to the reticulo-endothelial system and 35 pages to the haemo-lymph nodes—considerable attention being paid to those in ruminants—and 144 pages to leucaemia.

MISCELLANEOUS

DE MELLO, F. M. (1940). **The Izatnagar Institute.**—*Indian Fmg.* **1.** 69–76. 17 figs. on 4 plates, 1 table.

This article contains a description of the laboratories and activities of the different sections of the branch of the Imperial Veterinary Research Institute at Izatnagar, in the United Provinces. This institute which has been set up to investigate veterinary problems under conditions in the plains, is under the administration of the director of the parent institute at Mukteswar. In describing the working of the Izatnagar Institute, the history of the parent institute at Mukteswar is given.

The site at Izatnagar consists of about 750 acres of mixed arable and pasture land purchased by the Government of India in 1913. Until recent years this laboratory was intended primarily for the manufacture of antisera on a commercial scale for use in India and elsewhere. The farm area in the site was gradually developed and, owing to the necessity for experimental work on the various fodder crops and grasses best suited to the locality to provide fodder for the serum-producing animals, an Estate Section was formed. The serum-producing section was designated the Biological Products Section and this has now been extended by the addition of the Animal Nutrition and Poultry Research Sections opened in March, 1939.

ANIMAL NUTRITION RESEARCH.—The laboratories attached to this section are very complete in their equipment. Prior to the inauguration of animal nutrition research in India, a Physiological Chemists Section was started by the Government at the Imperial Agricultural Research Institute, Pusa, and later transferred to Bangalore (S. India), to form one of the two wings of the newly organized Imperial Institute of Animal Husbandry and Dairying. Owing to the lack of space at Bangalore, which prevented expansion of the section for a thorough study of the physiology of ruminants under Indian conditions, and malnutrition and degeneration in the Indian cattle population, this section was again transferred in 1936 to the Izatnagar Institute. The section is divided into four branches:—analytical, physiological, pathological and biochemical.

POULTRY RESEARCH LABORATORY.—This is situated in the same compound as the Animal Nutrition Research Laboratory, but in another magnificent building which provides the necessary facilities for research on poultry diseases, nutrition, physiology, incubation, and marketing of table poultry and egg products. The poultry farm is about half a mile from the laboratory and contains farm buildings, brooder houses and field cages for the proper care and management of each brood produced on the farm. The brooder house provides accommodation for 1,500 chicks under electric hovers and the farm itself has ample accommodation for 2,000 adult laying fowls.

BIOLOGICAL PRODUCTS SECTION.—This section of the institute is responsible for the manufacture of sera used for prophylactic purposes. About three million doses of protective serum for various diseases were issued

in 1938–39 to different parts of India and elsewhere.

The importance of the work being done can be appreciated only against the background of the huge animal industry of a country which carries one-fourth of the world's stock of cattle and two-thirds of its buffaloes; there are, in addition, in India nearly 97 million sheep and goats and 173 million domestic fowls. It is stated that a Genetics Section is expected to be added to the institute.—S. G. IYER.

QUARANTA, F. (1939). **Ethiopia. An Empire in the Making. Chapter IV. The Veterinary Services.** pp. 36–38. 1 plate. London: P. S. King & Son, Ltd.

This is a description of the veterinary work carried out by the Italians in Abyssinia since their conquest of that country in 1936. The country is divided into four provinces, each provincial government having a veterinary inspector assisted by a staff of veterinary officers stationed in the various districts. Great efforts have been made to control rinderpest, bovine contagious pleuro-pneumonia and foot and mouth disease by vaccination, and to this end the Instituto Sierovaccinogeno at Asmara, Eritrea, has been extended and a new institute inaugurated at Addis Ababa. Up to 1939, 298,000 cattle had been vaccinated [whether against one or all three of the diseases is not stated, neither is the total cattle population given]. Measures have also been taken by drilling wells to keep the nomadic tribes in their territories of origin, and thus prevent the spread of disease by herds being driven from place to place in search of water. Before the outbreak of the present war, negotiations were in progress with the governments of British Somaliland, Kenya, and the Anglo-Egyptian Sudan to prevent the spread of disease to and from these territories.

Besides vaccination work, the veterinary officers are also responsible for the inspection of animals at abattoirs, for the improvement of stock by breeding, and for the preservation of rare game.

—. (1938). **Research—A National Resource. I. Relation of the Federal Government to Research. Report of the Science Committee to the National Resources Committee.** pp. vii+255. Numerous tables. [Numerous refs.] Washington, D.C.: Supt. Documents. [4to] [50 cents].

This, it is stated, is the first of a series of reports on research resources of the United States, and was prepared under the direction of Dr. Charles H. JUDD, Dr. William F. OGBURN and Dr. Edwin B. WILSON. It is extremely full, covering every aspect of federal research including that carried out in universities and colleges, but does not deal with that of industrial laboratories or business organizations, social or welfare agencies, private institutions, or state or local governments; one of the recommendations of the committee is that further studies be made of these resources.

The report does not deal with the results of the research work, but with the machinery for its organization and in this connexion the committee recommends certain improvements, *viz*, in the methods of recruiting research workers for government service; financial support by the government for international meetings of scientists and the encouragement of American participation in international organizations and projects; the organization of government research in such a manner as to avoid the possibilities of bias through subordination to policy-making and policy-enforcing; research agencies of the government to extend the practice of encouraging decentralized research in institutions not directly related to the government, and the interrelations of government research agencies to be furthered by the organization of central councils.

There is also a very full description of the Library of Congress and its relation to research.

OFFICIAL AND OTHER REPORTS

INDIA. (1939). **(Sixth) Report showing Progress made in giving Effect to the Recommendations of the Royal Commission on Agriculture in India up to the end of 1937. Part 1.—Central Government.** pp. 31. Delhi: Manager of Publications. [fcp] [9 annas] [10d.]

ANIMAL HUSBANDRY.—Sheep breeding was fostered in all Provinces and efforts were made to improve the breeds of goats, but it was too early to report results. Sheep do not thrive in the Andamans.

Throughout the country attempts were made to grade up cattle for dual purpose by crossing local stock with other indigenous strains. With a view to improving dairy stock in Bombay

Province, breed registers were opened and the use was started of home-bred buffalo sires with milk records of their progeny. All breeding activities were officially sponsored, save for one private association in Orissa.

There is no public demand for a wholesome, unadulterated supply of milk and ghee in the towns, and little progress towards attaining such a supply could be recorded except in Madras.

As a result of intensive propaganda the cultivation of leguminous fodder crops has noticeably increased throughout the country.

VETERINARY AFFAIRS.—Antirinderpest goat tissue virus is now in general use and is very popular with cattle owners. Inoculation against the disease is still voluntary.

Except in Assam and Baluchistan the number of veterinary dispensaries and hospitals has been increased.

The recommendation of the Reorganisation Committee to close the Bombay Veterinary College has not been accepted. The Madras Veterinary College was affiliated to the University of Madras and the diploma course extended to four years. Veterinary research projects in the provinces are enumerated.

The Veterinary Department in the Punjab has been made an independent administrative unit.—G. WILLIAMSON.

SOUTHERN RHODESIA. (1940). **Report of the Chief Veterinary Surgeon For the Year 1939.** [MYHILL, B. A.] pp. 8. Salisbury: Rhodesian Printing & Publishing Co. [fcp].

Stock maintained fair condition throughout the year. Losses from poverty were negligible and this good position was due to ample rainfall, better control of veld fires, and improved provision for winter feed.

Abattoir statistics and results of tuberculin tests show that the incidence of TUBERCULOSIS is low. An outbreak of ANTHRAX was reported. Cattle in two areas were inoculated following recurrent outbreaks in previous years. BLACKLEG occurred sporadically and was satisfactorily controlled by vaccination. Seven fresh outbreaks of EAST COAST FEVER occurred. The system of transport by lorry of cattle for slaughter from infected areas was continued. An unidentified species of *Theileria* caused mortality at a farm in the Salisbury district. A serious extension of TRYPANOSOMIASIS occurred in the Chipinga district; treatment with tartar emetic and antimosan gave varying results. Bush clearing and experiments with fly-traps were in progress. Mortality from HEARTWATER was reduced following five-day dipping. No cases of FOOT AND MOUTH DISEASE occurred during the year and an existing quarantine area was reduced in size. No cases of RABIES occurred. Several outbreaks of MALIGNANT CATARRH occurred; mortality was not high. Five outbreaks of SHEEP SCAB were reported and were eradicated by dipping. Crotalaria POISONING caused mortality in horses at a farm in the Salisbury district.

The report concludes with statistics regarding the import and export of animals and of meat products etc., and meat inspection returns.—H. E. HARBOUR.

UGANDA PROTECTORATE. (1940). **Annual Report of the Veterinary Department for the Year ended 31st December 1939.** pp. 23. 4 tables, 4 appendixes. Entebbe: Govt. Printer. [8vo] [Shs. 2/–].

DISEASE CONTROL [SIMMONS, R.]—RINDERPEST remained a serious problem during the year. In January an outbreak in herds around Fort Portal was alarming owing to the risk of the disease spreading *via* game to the Semliki Valley and thence into the Congo, along the shores of Lake Albert, then northwards and eastwards throughout the northern section of the Western Province. Vaccination of all herds in the danger zone was carried out and guards and patrols were used. Other cases appeared in the Mubende district and south of Lake Wamala. By June the situation appeared to be well in hand. In July an outbreak occurred in Samia County, Eastern Province. Towards the end of the year when the position was considered comparatively safe in the Western and Buganda Provinces, the disease appeared in the Masaka district; the difficulties of eradication in "game" areas are stressed. In the east, the position in Karamoja gave rise to anxiety in the last months of the year.

The position as regards BOVINE CONTAGIOUS PLEURO-PNEUMONIA and TICK-BORNE DISEASES remained the same as in previous years.

The incidence of FOOT AND MOUTH DISEASE lessened, and there were no serious outbreaks of ANTHRAX or BLACKLEG.

Some extension of the Maruzi fly belt is recorded, and TRYPANOSOMIASIS is becoming more common in herds in the Kwania county adjoining the Lango district. Details are given of the year's work in the various sectors against the tsetse fly and of fly surveys.

EDUCATION [CARMICHAEL, J.]—Six students attended the veterinary school. It is recorded that the Education Officer was called up for active service and the teaching was carried on by the Acting Senior Veterinary Research Officer.—J. C. WALLACE.

UGANDA PROTECTORATE. (1940). **Annual Report 1939 of the Senior Veterinary Research Officer, Entebbe.** [CARMICHAEL, J.]—*Rep. vet. Dep. Uganda, 1939*. pp. 14–21.

Laboratory products manufactured were :– 381 litres of rinderpest vaccine ; 261·69 litres of rinderpest serum, and 1,725 doses (1 c.c.) of fowl typhoid vaccine.

Research was carried out on RINDERPEST. Six Ankole cattle were inoculated with attenuated goat virus, Kabete strain. All but one showed some reaction, but no gross lesions of the disease, and immunity tests were satisfactory. Similar investigations were carried out with virus from a bovine source passaged through goats (Uganda strain) and domestic pigs (source not stated) ; in the former case after 52 passages and in the latter case after 26 passages, no evidence of attenuation was obtained. For serum production, hyperimmunization was by the intravenous route and serum producers were bled on four occasions only after each hyperimmunization. A subcutaneous injection of concentrated virus in the form of spleen extract was also given in order to reinforce the antibody content of the serum. The standard glycerinated spleen vaccine contains 3·3 g. spleen pulp to each 10 c.c. The lack of an easy test for standardization of rinderpest serum is emphasized. It has been found that reactors to virus inoculations which only show a small rise in temperature produce a vaccine as efficient as those showing a high temperature reaction.

The effect of the injection of virulent cultures of bovine type tubercle bacilli into Zebu and Ankole calves was studied. The Ankole calves were as susceptible as calves of British breeds, but the Zebu calves showed considerable resistance : this conforms with observations on natural TB. in these cattle.

A case of natural infection with *Trypanosoma vivax* and *T. uniforme* of a half-grown sitatunga is recorded.

Work on TURNING SICKNESS continued, but was inconclusive. Research on the state of the cerebrospinal fluid in this disease has been published [*V. B.* **10.** 718].

Cases of RICKETTSIASIS in dogs were treated with proseptasine and soluseptasine. There were no deaths and the latter was more efficient. Experimentally, the disease was transmitted to other dogs by subinoculation of infected blood and of an emulsion of *Rhipicephalus sanguineus* from infected dogs.

The results of experiments on helminth egg counts of faeces of cattle, sheep, goats, and horses are given. This is helpful in deciding when treatment is necessary. The report concludes with particulars of helminths found P.M. in cattle and sheep.

Notes are also given on a suspected mineral deficiency disease in cattle, on an unidentified disease of goats and on dysentery in calves.
—J. C. WALLACE.

TUNIS. (1938). Fonctionnement des services de l'Institut Pasteur pendant l'année 1937. [**Report of the Pasteur Institute, Tunis, for 1937**].—*Arch. Inst. Pasteur Tunis*. **27**. 219–238. 2 tables.

During the year, 1,800 people applied for antirabic treatment and 1,190 received it. The routine followed was that detailed in February 1933. Two deaths from RABIES occurred, one 10 days and the other 25 days after treatment. Dogs in 1,666 cases, cats in 67 and human beings in 27 cases were the cause of suspected infection, the rest being attributable to other animals. Of the suspected infecting agents, 86 proved to be rabid and 1,104 were presumed infected.

116 veterinary diagnostic examinations were made of material such as blood, urine, milk, etc.

1,169 doses of antiblackleg vaccine, 570 doses of veterinary antirabic vaccine, and some fowl cholera, avian typhoid and swine fever vaccines were produced. Other biological products were received from elsewhere.
—G. WILLIAMSON.

ANGOLA. (1938). Serviços de veterinária e pecuária. Relatório do serviço do ano de 1936. [**Veterinary and Livestock Report, 1936**]. [AIRES, A. A.]—*An. Serv. Vet. Pec. Angola, 1937*. pp. 5–35. 5 plates. 16 tables.

The disease causing greatest losses was still BOVINE CONTAGIOUS PLEURO-PNEUMONIA, and the necessity of making vaccines in the colony is urged. Other diseases causing serious losses were ANTHRAX, TUBERCULOSIS, TRYPANOSOMIASIS, MANGE, CYSTICERCOSIS, and TICK-BORNE DISEASES. No cases of BOVINE BRUCELLOSIS were reported during the year.

The report describes the progress of the various stock farms and studs. The necessity is stressed of increasing the staff of veterinarians and of completing a central laboratory. Much information is given in statistical tables.

—MILLER WATSON.

ANGOLA. (1938). Alguns elementos estatisticos da actividade dos serviços de veterinária e pecuária. **[Statistical Report of Veterinary Work in 1937]**. [AIRES, A. A.]—*An. Serv. Vet. Pec. Angola, 1937*. pp. 119–211. 5 charts.

The personnel of the service included the chief veterinary officer, 12 assistant veterinary officers, 29 technical assistants and five African attendants. 61,882 vaccinations were carried out against BOVINE CONTAGIOUS PLEURO-PNEUMONIA, 69,789 against ANTHRAX, 1,093 against SWINE FEVER, and 73 against RABIES, a considerable increase over those done in the previous years. 116,610 bovines, 24,340 sheep, 1,206 swine, 28,621 goats, and 1,421 solipeds were dipped in the State dipping tanks in 19 localities. 2,780 bovines, 42 sheep, 26 swine, 34 goats, and 24 solipeds were castrated during the year.

At the end of 1937 the State stock and breeding farms contained 2,282 bovines, including 200 bulls. The majority of the cattle were native, but there were 15 Hereford bulls. On the stock farms were 1,074 sheep, mostly native, but including also Persian Blackheads, merinos and cross-breds of these with natives. There were 221 head of swine mostly Large Black and Large White, and 294 fowls mainly Rhode Island Reds and White Leghorns.

The report shows the number of carcasses which were condemned, mainly on account of cysticercosis, at the various abattoirs during the year.—MILLER WATSON.

EXTRACTS FROM ANNUAL REPORTS OF AGRICULTURAL EXPERIMENTAL STATIONS U.S.A. [The matter given here is a bare outline of the work done. When papers by the staffs of these stations are published, abstracts are prepared from them and included in the *Veterinary Bulletin* as a matter of routine. Details of the titles of these reports will be found in *Index Veterinarius*.]

ARIZONA, 1937–38.—5 c.c. injections of gonadotrophic serum given in two doses at 18-day intervals did not produce ovulation in Black-Faced ewes. Good results have been obtained in the control of ACTINOMYCOSIS by giving potassium iodide (3 dr. per day) in the drinking water. Sodium iodide (1 oz. in 250 c.c. of sterile water) also gave good results. For the first time INFECTIOUS RHINITIS occurred in a herd of swine in Arizona and considerable losses were suffered.

ARKANSAS, 1938–39.—A description of the pathological conditions of the endocrine organs of the rat in AVITAMINOSIS is given.

COLORADO, 1938–39.—In work on POISONOUS PLANTS, silky sophora (*Sophora sericea*), previously under suspicion, was found to be non-toxic. *Bahia oppositifolia* was found to contain hydrocyanic acid and to be toxic when fed to a steer, ewe and g. pig. *Oxytenia acerosa* may now be listed as poisonous. In a series of 199 lambs and five ewes autopsied, 41 showed "fringed tapeworms" (*Thysanosoma actinioides*) in the liver, 39 in the intestines, and 19 in both the intestines and the liver. Up to 4,384 cases of EQUINE ENCEPHALOMYELITIS were reported, the mortality being approximately 15%. The use of chick vaccine was a satisfactory control measure. Work on SLIPPED TENDON indicates that phosphorus alone added to a ration moderately low in calcium does not cause this disease, but when calcium is added to rations already high in phosphorus perosis is aggravated. The iodine requirements of poultry are also discussed.

GEORGIA, 1938–39.—Work was carried out on PARASITES. The stomach worm *Haemonchus contortus* and the nodular worm *Oesophagostomum columbianum* cause most damage in this state.

ILLINOIS, 1938–39.—The various methods of controlling BRUCELLA INFECTION are discussed. The permanent advantages of treatment for INTESTINAL PARASITES of horses are shown in tabular form. During the year, losses from "CORNSTALK DISEASE" in horses diminished, only an occasional outbreak being reported in contrast to a loss of 5,000 horses in 1935. Up to date the aetiological findings are negative, but the disease may be controlled by preventing horses from having access to damaged maize. A project has been started to produce strains of chickens resistant to PULLORUM DISEASE. The number of recorded outbreaks increased from 228 in 1936 to 493 in 1937. During the past year 133,125 lots of pullorum stained antigen were prepared and supplied. Control of INFECTIOUS BRONCHITIS is an urgent problem. A total of 29,504 doses of FOWL POX vaccine were prepared. 8,037 doses of egg-propagated

virus and 6,157 doses of comb virus were distributed to veterinarians. *Pfeifferella anatipestifer* infection in ducks appeared in the state for the first time.

Iowa, 1938–39.—Experimental work demonstrated that the vitamin E requirements of goats were vastly different from those of rats. Results indicated that either goats do not need vitamin E for normal reproduction or that, if synthesis of the vitamin by the goat does occur, it is produced only in amounts sufficient to meet the requirements of the developing foetus. Range Paralysis in poultry, and a genetic investigation of the resistance and susceptibility of laboratory animals to typhoid-like diseases are also dealt with.

Maryland, 1938–39.—Further work on Brucella Infection using milk samples from cows showing suspicious agglutination reactions failed to show the organism in the udder. A scheme termed " Bang's Disease—Calfhood Vaccination " was begun, and at present 16 herds containing 650 vaccinated animals are under observation. Sulphapyridine, was found to be ineffective for the treatment of the disease. Chicks from a Maryland experimental station, bred for resistance to Pullorum Disease over an 11-year period, exhibited a significantly higher survival rate throughout trials when compared with pullorum-clean and pullorum-tested stock. During the year, Trichomoniasis was found in a few herds. A record, in tabular form, is given of the major activities of the Maryland livestock sanitary service.

Mississippi, 1938–39.—Possibly one-third of all the turkeys hatched in this state die each year from Blackhead. The use of tobacco dust in the ration has given encouraging results in protection of turkeys against this disease. The feeding of 2% tobacco dust to chickens has been found effective for the eradication of Roundworms.

Nevada, 1937–38.—The present Veterinary Science building now houses the joint offices of the Research Station and the State Veterinary Control Service, as well as the station's chemical and bacteriological laboratories. Problems mainly studied have been Redwater, and Encephalomyelitis of horses.

New Hampshire, 1938.—Studies carried out in animal metabolism and nutrition are briefly described. Experiments have shown that whole milk feeding of dairy calves can be limited to a period of a few days following birth, if skim milk is supplemented with cod liver oil concentrate.

Experiments showed that if calves are vaccinated against Brucellosis between the ages of 4–6 months the majority will give a negative blood reaction within a year. 50,011 blood samples were tested during 1937–38, as compared with 22,026 for the previous year. Out of a total of 243 cows tested for Mastitis, 92 animals or 38% showed infection. 535 strains of streptococci have been isolated from infected cows, and 87·7% have been identified as *Streptococcus agalactiae*. Experiments indicate that neither vaccines, prontylin, nor prontosil are effective in treatment. New records for the highest percentage of adult birds tested in the state and the lowest percentage incidence of Pullorum Disease of any state in the U.S.A. were established for the season 1937–38. 47% of the total adult birds of the state were tested, with 99·94% non-reactors. Eleven flocks were added to the list of pullorum-free flocks, making the total 96 clean flocks. One flock was removed from the list because of infection and four on account of failure to test. Birds artificially infected with chronic Coccidiosis showed definite improvement under litter treatment with sulphur in one case and with the feeding of bicarbonate of soda in another case. Experiments indicated that Rickets in young chickens is not favoured by chronic coccidiosis. The total number of doses of Fowl Pox vaccine distributed during the year was 264,400, a decrease of 29,800 on the previous year. During the year, 65,400 doses of Laryngotracheitis vaccine were distributed, as compared with 97,100 doses in the previous year. Poultry autopsies carried out during the year numbered 1,762 ; ruptured egg yolk was the principal trouble, being found in 24·2% of all adult birds examined.

New Jersey, 1937–38.—Research on Dairy Cattle Disease, made possible by special appropriation, was attempted on a large scale during the year. The Experimental Station at Beemerville has been placed at the disposal of the research staff. Studies were continued on Poultry Diseases, 6,143 specimens from 2,121 farms being examined during the year. Work continued with the paralysis-free line of White Leghorns and the so-called paralysis line of Leghorns. Tabulation of the results shows that both the percentage of total mortality and the percentage of paralysis have been decreasing in the paralysis-free line.

PENNSYLVANIA, 1938–39.—Results of a feeding experiment showed that pigs weighing 40–70 lb. made the most efficient use of high protein rations, while pigs weighing more than 150 lb. were wasteful in this respect. Stiffness occurred in from 40–60 % of the experimental animals. Addition of cod liver oil concentrate did not alleviate this condition nor did adjustments of the amount and proportion of the minerals present in the ration. The production of stiffness seems to be characteristic of rations which are made up of maize, alfalfa, soybean oilmeal, low protein tankage, and salt. A deficiency of manganese may be a contributing factor in the disorder, no stiffness having been observed in 15 pigs which were fed a manganese supplement.

SOUTH CAROLINA, 1937–38.—Among the many causes of DIGESTIVE DISTURBANCES and SCOURS in calves is the spillage of milk into the rumen when the calf is swallowing. The "Coyner" nipple pail designed to simulate the natural method of milk consumption has been studied and results indicate that the individuality in the manner of drinking from an open pail is an important factor in whether or not milk enters the rumen. Sulphanilamide gave good results in the treatment of acute MASTITIS. Whole oats supplied "free choice" apparently reduced the incidence of CANNIBALISM in poultry. The addition of manganese to a ration without oats was of no benefit in the control of the condition. The control of KIDNEY WORMS and ROUNDWORMS in swine by methods of sanitation is discussed.

SOUTH DAKOTA, 1937–38.—In connexion with SELENIUM POISONING, results of the vegetation survey are given together with a list of the plants which take up selenium in high concentrations. The effects of vitamin D deficiency in cows are described. In dealing with anthelmintics, the properties of oil of chenopodium, obtained from plants produced by the cross-fertilization of *Chenopodium ambrosioides* with a wild variety, are recorded and the anthelmintic properties of this cross against ASCARIS are described. An experiment on immunization against HAEMORRHAGIC SEPTICAEMIA is recorded.

SOUTH DAKOTA, 1938–39.—Preliminary results seem to indicate that chenopodium plants may be used as a forage crop for hogs to eliminate worms. The bacterin for HAEMORRHAGIC SEPTICAEMIA immunization which, had been found to give the best results was one in which organisms of a buffalo strain were grown in a medium consisting of one part of normal rabbit serum and three parts brain-heart infusion, incubated for 48 hours, the whole culture being then treated with formalin. It was found that the addition of normal rabbit serum to the broth greatly increased the immunizing power of the bacterin. Work on the prevention of SELENIUM POISONING by feeding arsenic has given excellent results with rats and dogs.

TEXAS, 1937.—In two out of three experiments, cows which were drenched with the putrid material of mice dead (experimentally) from LOIN DISEASE developed the disease. [No further details given]. A recently organized scheme provides for the study of insect vectors of ANAPLASMOSIS in Texas. All attempts to transmit the disease by means of *Dermacentor variabilis* and various flies failed. Experiments showed that fever reactions indicating positive immunization (by infective blood) began on an average about 31 days after infection and lasted for an average of 7½ days. Station records show that one animal was recorded as a carrier over a period of 5 years and 2 months. Another which was the reservoir for immunization still harboured infection after 6½ years. Control of TRICHOMONAD ABORTION in the College dairy herd consisted of suspending breeding operations for six months and local treatment of the bulls' penis. POISONOUS PLANTS causing losses are discussed. Vitamin A requirements for beef cattle and for sheep and goats, and vitamin D and mineral requirements for chicks are discussed, and dietetic experiments in connexion with SLIPPED TENDON are recorded.

TEXAS, 1938.—A number of experiments on ANAPLASMA INFECTION with different species of biting flies and ticks (*Amblyomma maculatum*, *Dermacentor variabilis* and *Ixodes ricinus*) was carried out, but no transmissions were obtained. Studies made on the use of the so-called distilled water mercuric chloride and formol-gel tests indicate that these tests cannot be relied upon to pick out carrier animals in all cases. Experiments were made on vitamin deficiencies. The vitamin A requirements for cattle, sheep, and goats were determined and a preliminary investigation on the role of nicotinic acid in the nutrition of ruminants was completed but no definite conclusions were drawn. Studies on the vitamin A requirements of chicks showed that 100–125 μg. of carotene per 100 g. of feed gave

as low mortality and as satisfactory health as did higher levels of carotene.

WISCONSIN, 1938–39.—A disease diagnosed as distemper killed large numbers of mink during the year. Dog distemper antiserum produced only a temporary immunity, but a more lasting immunity was conferred by a tissue vaccine made from the internal organs of a mink that had died of the disease. A serious disease of unknown aetiology and affecting both mink and foxes, is also described. The findings of the investigations being carried out in regard to hormone response and STERILITY in cattle are recorded. Other important points from the report are as follows :– saline pills help to overcome the more serious effects of COCCIDIOSIS, probably by maintaining a constant osmotic pressure in the blood and thus reducing the blood sugar content; SLIPPED TENDON or PEROSIS in chicks is caused by a deficiency or imperfect absorption of manganese due to excess of calcium phosphate (contained in bone meal) in the ration [see also *V. B.* **11.** 49.]; feeding small amounts of desiccated thyroid prevents the structural changes which normally take place in the liver during the treatment of vitamin B_1 deficiency by thiamin.

WYOMING, 1938–39.—A high content of potassium nitrate in oat hay was found to be the cause of heavy losses in cattle in northern and eastern Wyoming. The nitrate breaks down in the rumen to produce nitrite which in turn enters the blood to produce methaemoglobin, thus causing death from lack of oxygen as in carbon monoxide poisoning. Sheep did not seem to be as susceptible as cattle. It was found that there is a wide variation in the hydrocyanic acid content of arrow grass. The drier the soil upon which the plant grows, the higher the hydrocyanic acid content. Intravenous injection of a mixture of sodium thiosulphate and sodium nitrite was found more effective as an antidote for cyanide poisoning than sodium tetrathionate. An introduced weed, *Salvia lanceolata*, belonging to the mint family was suspected of causing losses in the Platte county. 1 lb. dried weight of this plant given in ½ lb. doses kills a 100 lb. sheep. Tests with lambs on the state farm at Worland indicate that little or no benefit results from vaccination of sheep for INFECTIOUS SORE MOUTH after the land has been exposed to infection, or from vaccination less than ten days previous to such infection. In carefully controlled experiments at the stock farm, Laramie, vaccines prepared at the station protected lambs from the disease. Immunity was developed within three weeks after vaccination. Outbreaks of ABORTION in ewes have occurred in a few places. In some of the cases it seemed possible that the cause was heavy feeding with barley. A third year of tests on ROUP in chickens showed that inoculation with coryza in summer is valueless for giving pullets an immunity against roup in the winter. During the year, 27,251 blood samples were tested for BRUCELLA INFECTION, 3·7% of them being positive. On May 1st, 1939, 11·8% of all breeding cattle over six months old in the state were under supervision for eradication of the disease.

X-ray treatment was unsuccessful for cure or prevention of COCCIDIOSIS, and domestic chickens could not be infected with *Eimeria centrocerci* or other species of *Eimeria* which infect the sage grouse.—F. T. BOYLE.

BOOK REVIEWS

BODANSKY, M. [Ph.D., M.D., Director of the John Sealy Memorial Laboratory and Professor of Pathological Chemistry, University of Texas School of Medicine], & BODANSKY, O. [Ph.D., M.D., Lecturer in Biochemistry, Graduate Division, Brooklyn College]. (1940). **Biochemistry of Disease.** pp. viii+684. 72 figs. [Numerous refs.] London & New York: The Macmillan Company. [8vo] [30s.]

The special feature of this book is its systematic presentation of the biochemical aspects of various diseases arranged according to clinical entities. It is, therefore, of particular value to the physician who has little time to keep abreast of advances based on biochemical principles, and who wishes to look these up in relation to familiar syndromes. To the specialized biochemist it is useful as providing a survey of wider fields than the one in which his own activities lie.

General presentations of the chemistry of physiological processes are avoided as lying within the domains of the numerous text-books on biochemistry proper, and general principles are only referred to in specific connexion with relevant diseased conditions. Laboratory pro-

cedures are only mentioned in relation to functional tests in which the participation of the physician is required. Infectious diseases and malignancies are dealt with in connexion with disorders of the specific organs affected.

The 18 chapters deal successively with diseases of the blood, of the heart, of the respiratory tract, of the kidney and urinary tract, of the digestive tract, of the liver and biliary tract, of the pancreas; of adrenals, pituitary, thyroid, parathyroids; of bone, of muscle, of the male gonads; the application of biochemistry to problems in obstetrics and gynecology; miscellaneous disorders of nutrition; miscellaneous disorders of metabolism; biochemical aspects of neurologic and psychiatric disorders.

An extensive bibliography is given at the end of each chapter and good author and subject indexes are provided. Although the appeal is primarily medical, the veterinarian interested in comparative medicine and pathology will find many points of contact.—H. H. GREEN.

TOPLEY, W. W. C. [M.D., F.R.C.P., F.R.S., Professor of Bacteriology and Immunology in the University of London]. (1940). **Authority, Observation and Experiment in Medicine.** pp. 46. London: Cambridge University Press. [8vo] [1s. 6d.]

In this 1940 Linacre lecture, T. reviews certain landmarks in the advance of medical science since Linacre's time 400 years ago, and shows how the rule by authority, chiefly of Galen, dammed back progress for hundreds of years. The audience was reminded that " the intellectual authority of books or men is incompatible with science and the scientist can never regard his books as more than temporary codifications of current working hypotheses ".

The true flowering of medical science is a very recent occurrence and in this connexion the lecturer warns us against the danger of ruling research by committees, " which are dangerous things and need the most careful watching ". He believes that a research committee can do one useful thing, and one only, namely, find workers best fitted and most anxious to attack a particular problem, and provide facilities for them.

Finally, we are told that it is from research laboratories that we are to expect the great medical discoveries of the future.—J. E.

NUTTALL, G. H. F. [M.D., Sc.D., Ph.D., LL.D., F.R.S.] (1940). **Notes on the Preparation of Papers for Publication in *The Journal of Hygiene* and *Parasitology*.** pp. 62. Cambridge: University Press. [8vo] [4s. 6d.]

This short book, representing notes left unpublished by the author at the time of his death in 1937, selected and edited by GRAHAM-SMITH and KEILIN in 1940, is a masterpiece which all young scientific authors should buy as part of their educational equipment, and which even those who regard themselves as practised writers should find exceedingly useful in keeping the " editorial point of view " constantly in mind.

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—H. H. GREEN.

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